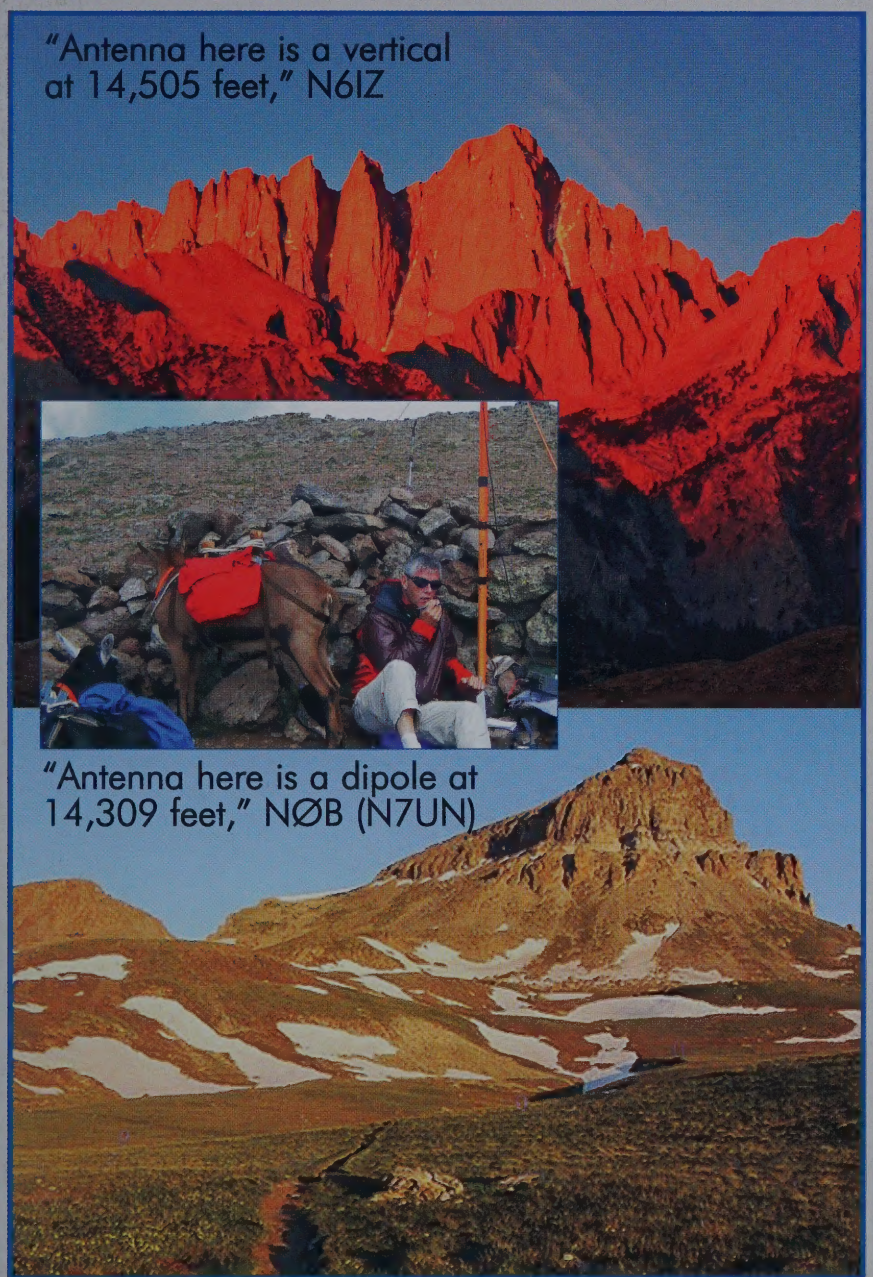
YOUR CONSTRUCTION AND OPERATING QRP SOURCEBOOK

QRP Quarterly

Volume 50 Number 2
Spring 2009
$4.95

Journal of the QRP Amateur Radio Club International



- *On the Cover*—
  QRP-to-QRP, Mt. Whitney to Uncompahgre Peak
- N8ET's Great Lakes Sailing & Ham Radio Adventures
- N7ZWY Builds the 'Clyde Crashcup' Transmitter
- Contest Results—
  2008 Top Band Sprint
  2008 Holiday Spirits HB Sprint
  2009 Pet Rock Celebration
  2009 Fireside Sprint
- *Special Feature*—
  The A/N X-15 Galactic Transceiver

QRP ARCI℠ is a non-profit organization dedicated to increasing worldwide enjoyment of radio operation, experimentation and the formation and promotion of QRP clubs throughout the world..

LDG ELECTRONICS

The #1 Line of Autotuners

NEW! Z-817

The Z-817 is the ultimate autotuner for QRP radios including the Yaesu FT-817(D). The Z-817 interfaces to the CAT port (ACC) on the back of the FT-817 radio with the provided cable. Tuning could not be simpler; one button push on the tuner is all that is needed and the Z-817 takes care of the rest. It will switch to PKT mode, transmit a carrier, tune the tuner, then restore the radio to the previous mode! 2000 memories cover 160 through 6 meters.

Of course, the Z-817 will also function as a general purpose antenna tuner with other QRP radios. Just transmit a carrier and press the tune button on the tuner. The Z-817 is powered by four AA internal Alkaline batteries (not included), so there are no additional cables required to use the Z-817. A coax jumper cable is also induced for fast hook up. Latching relays are used so that power consumption is Zero when not tuning allowing a set of batteries to last about one year. ***Suggest Price $129.99.***

SPECIFICATIONS

- *Up to 20 watts SSB, CW and digital modes.*
- *Latching relays for ultra low power consumption.*
- *Battery operated 4 x 1.5V Alkaline AA (not included).*
- *Built-in CAT port interface. CAT thru port for computer connection.*
- *2000 memories when used with FT-817 interface (200 memories for other radios).*
- *1.8 to 54 MHz coverage (continuous coverage for MARS)*
- *Tunes 6 to 600 ohms. (16 to 150 on 6M)*
- *SO-239 in and out connections for dipoles, verticals, beams, G5RV, OCF, Cobra, ect.*
- *Dimensions: 5.2"W, 4.6"D, 1.7"H. Weight: 13 ounces.*
- *Includes 1 foot CAT cable and 1 foot coax jumper.*

Z-11Pro

The original portable Z-11 was one of LDG's most popular tuners, accompanying adventurous hams to their backyards, or to the ends of the earth. Now meet the Z-11Pro, everything you always wanted in a small, portable tuner. Designed from the ground up for battery operation. Only 5" x 7.7" x 1.5", and weighing only 1.5 pounds, it handles 0.1 to 125 watts, making it ideal for both QRP and standard 100 watt transceivers from 160 - 6 meters. It will match dipoles, verticals, inverted-Vs or virtually any coax-fed antenna. All cables included. ***Suggested Price $179***

NEW! Z-100Plus

LDG's popular Z-100 economy tuner is now the Z-100Plus. Still small and simple to use, the Z-100Plus sports 2000 memories that store both frequency and tuning parameters. It will run on any voltage source from 7 to 18 volts; six AA batteries will run it for a year of normal use. Current draw while tuning is less than 100ma. The Z-100Plus now includes an internal frequency counter so the operating frequency is stored with tuning parameters to make memory tunes a blazingly fast 0.1 seconds; full tunes take an average of only 6 seconds. ***Suggested Price $159.99***

Call or visit your favorite dealer today!

Visit www.ldgelectronics.com for a complete dealer list.

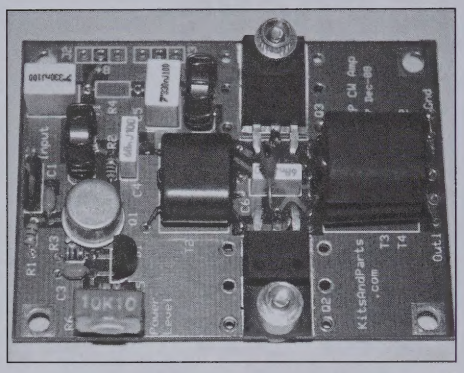
LDG Electronics, Inc.
1445 Parran Road
St. Leonard, MD 20685
Phone 410-586-2177
Fax 410-586-8475

LDG

Table of Contents

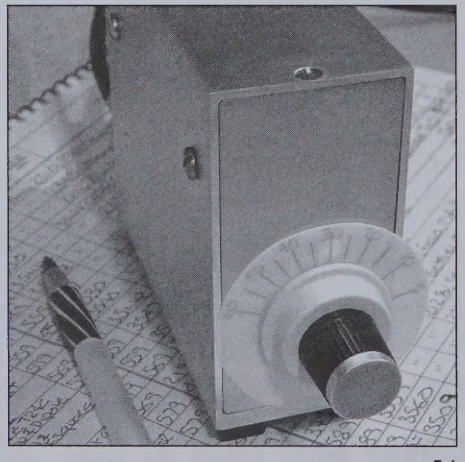
QRP Quarterly

Volume 50 Number 2 – Spring 2009



page 20

page 36



page 54

From the President

Dick Pascoe—GØBPS president@qrparci.org

How strange it is when we look back in our lives to see the changes that have occurred. Just ten years ago I was wandering around the flea market at Pacificon when Jim Stafford, W4QO (then Vice President of ARCI), stepped up alongside me and asked if I was interested in joining the Board of Directors. A few months later I was the second citizen of the UK to join the list of board members. (The first was Chris Page, G4BUE, some 25 years ago).

In early 2002, I was asked if I would like to take over the post of Vice President of QRP-ARCI, little did I know what I was letting myself in for. The then President wasn't able to get to Dayton and FDIM so all of that hoo-ha fell onto my shoulders.

My first two years as VP passed quickly, and when Joe Spencer, KK5NA, resigned as President, the Board asked me to step up and take over this prestigious post for the next three years.

I was VERY aware of the honour being bestowed on me as the very first non-American ever to hold the post in the club's 40-year history. I was even more humbled when, at the end of my three year term, the Board asked me to stay on as President for a further term of office.

It is part of the By-Laws that the members of the Board of Directors serve for four years and the other senior officers serve for three years. This enables a form of continuance in the affairs of the club. However, during the past year I became aware of a problem with the way the officer's terms worked. We all started our term of office on the 1st April, just six weeks *before* our prestigious FDIM. It seemed much more sensible that the term of office started *after* FDIM. The board agreed, and thus, from now on *all* terms of office start from July 1st each year. This gives all new members of the BOD and officers several months to get used to the work involved in FDIM.

During this period I also felt the time was right for me to step down as President rather than wait another year. After two years as VP and five years as President, I felt that the club needed a fresher face with some new ideas to see the club forward. Therefore, I will cease to be your President on the 1st July and the BOD will have selected your new President.

I have had a rollercoaster ride over the past seven years; most will not know what happens behind the scenes, but I will say that there have never to my knowledge been any arguments between your leaders. Strong differences of opinion, yes, but this helps to make the club stronger.

There have been several highlights of my term, seeing a couple of hundred Americans at the banquet drink a toast to the Queen of England, "Enjoying" the Year of the Tent. Trying and often failing to get Hank, K8DD, to buy the beer!

Seeing the faces of those that have sat at the banquet and listening to me read out the nominations for Hall of Fame. The sheer joy of seeing the shock on their faces as their name is called. One in particular cried as he stepped forward.

Other highlights of my American trips are: Spending the weekend at the home of the legend—Doug DeMaw, W1FB, and his wife, Jean. A year later; being at ARRL HQ and seeing Doug walk towards me, he shouted, "Hi Dick," and then I was able to introduce him to an unknowing senior staff member, and of course, being elected to the highest honour I could ever imagine—QRP HOF 1997.

Any leader of an organisation is only as good as the staff he has with them. As president, I have been honoured to have the support of my VP Ken, W4DU. The rapport between us has amazed me at times. We often think alike, and this has been a

(*continued on next page*)

great benefit to the club. All of the other officers have been immense help to Ken and me, and several have also become firm personal friends.

QRP-ARCI is a very, very lucky organisation in the strength and enthusiasm of its officers and their dedication to the club. The amount of work that goes into setting up FDIM is immense, and without the help of a few members such as Norm Schklar, FDIM would not be the success it is.

Rev George Dobbs, G3RJV, commented recently on how the club has moved forward in leaps and bounds over the past few years, a sincere compliment to all officers and BOD members.

Finally: I would now like to thank all of you for the support you have given me as your president over the past five years. Please show the same support for your new President.

In England we have a saying when the monarch dies: The King is dead, long live the King.....

73/2, Dick Pascoe, GØBPS ...SK

(Not quite dead, but silent)

●●

QRP News

The Triple Play Award

During 2009, ARRL is sponsoring the Triple Play Award. Work all 50 states on SSB, CW, and RTTY/digital during 2009, confirm each QSO on Logbook of the World (LOTW), and you have earned the award. I am always looking for ways to encourage members of our local club to get on the air, and the TPA seemed like a good way to do that.

When the award was announced late in 2008, I stood up at the club meeting and issued a challenge. I said that the CW operators in the club could work and confirm all 50 states before the phone or digital guys could do it. The challenge was accepted, and one of the members volunteered to get our LOTW account activated again, and get the club's PCs set up so that logs could be done electronically and submitted to LOTW.

The CW ops (both of us!) got together and decided our best strategy was to have an all out effort to work states in the 160 CW contest in January (many contesters use LOTW, so confirmations would be likely). We did that, and worked 49 of the 50 states that weekend on 160 meters. We missed WY. Actually, WC7S in WY called us several times, but we did not hear him, so we worked him later that week after corresponding on QRP-L. The 49 states we did work were all confirmed in LOTW by mid week. Wyoming followed the next week (it took Dale a few days to get his LOTW passwords sorted out!).

The phone and digital guys are working hard to get 50 confirmed. The TPA has gotten several people on the air at our club station, and they are finding out there is more to ham radio than a handheld and repeaters. In fact, they are having so much fun operating HF they even got on the ARRL Phone DX test this past weekend!

I had a great time chasing states (and LOTW confirmations), so I decided to do it from home also on my own. I blew the dust off the rig, fixed the 80/40m inverted vee that had needed to be repaired for a long time, and got the old tri-bander pointed where the rotor said it was pointing. I actually got on the air from home—something I had not done for any significant amount of time in a LONG time. I got my LOTW account going (it took a call to their help desk—they were great!) and then got going. I operated a couple of contests and got a good number confirmed on CW and RTTY. I use N1MM software when I operate a contest, so submitting a log to LOTW was easy. For general purpose logging, I noticed that most of the guys on the Yahoo LOTW group used the DXLabs suite of programs, so I downloaded all the programs and started using them.

My next step was to log on to K3UK's scheduling web site (http://www.obriensweb.com/sked/) and start chasing the states/modes I needed. It was a great way to fill in the missing states/modes. There were evenings when I would get a dozen new states/modes confirmed. I began filling general log on February 5. I got my last state (Maine) on March 2. I just checked the web site while writing this article, and there are 27 states logged on to the site. Several of the regulars on the site have the TPA, and are working at getting all 50 states on all bands on all three modes!

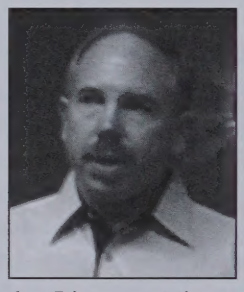
So, if you are looking for something different to do with your amateur radio time on the air, try the TPA. Sign up for LOTW, use the web site (or not), operate contests (or not), get it quickly (or not), do it all with QRP (required for this magazine!), one band or all bands, whatever—get on and have fun! It got me on the air, it encouraged me to fix my antennas, it got me active on a new mode (RTTY), and most importantly, it got some new hams in our club active on HF.

Info about LOTW and TPA is available on the ARRL web site.

—73/72, Bill Kelsey, N8ET

Farewell to a Friend

Recently, Paul Maciel sent me an e-mail that I knew was coming, but it was still a shock to receive. Bob Okas, W3CD, is a silent key. Bob fought cancer hard, but the fight ended on a Sunday morning.



Bob was one of the "good guys" that I have met through amateur radio. He was extremely bright and was a fountain of information. Plus, he was very approachable, and never, ever made you feel bad about asking a question. He gave you straight answers, and did it in terms that you could understand.

He was an extremely talented guitar and mandolin player, and I was fortunate to have played with him several times at qrp events. He was the same way in music as in ham radio. If he was in a group with beginners, he made sure that he kept the music at a level that they could enjoy and participate, too. But if he was with a higher level of talent, just like in ham radio, he could "compete" with the best of them. I remember one time at Pacificon watching him play with Jim Kortge, and it was a treat.

He was a big supporter of NorCal, and did a lot of design work for the club. His

legacy will surely be the FCC-1 and FCC-2 kits, which were a marvel because of their performance for the price. The FCC-1 was the kit that helped NorCal get back on its feet after the split with the American QRP Club, much as the NorCal 40 transceiver put the club on the map originally and helped to kickstart the club kits. His talk at Pacificon was one of the best that we have ever had; those in attendance were glued to the presentation.

Bob was at just about every NorCal meeting, and was always willing to help anyone with any type of radio problem. He and Bill Phillips were good friends much like Jim Cates and myself. You always saw them together until Bill moved back east after he retired. Bill, I know how you feel today, and there is nothing that I can say that makes it any easier to lose a friend like Bob. Time will help, but you will always miss Bob.

I and many others will miss Bob, he was a good man, a good friend, and a good person. God bless you, Bob, and may you be at peace now.

—Doug, KI6DS

FDIM 2009

FDIM 2009 SEMINAR SPEAKERS

What a great lineup of speakers for 2009! You'll hear everything from operating in Russia to how to better use of that test equipment sitting on the shelf to a good bit of QRP related humor. If you have not attended before, this is the year. If you're a regular, this is another great one. See You There!

Rev George Dobbs, G3RJV	*Yet More QRP*
Oleg Borodin, RV3GM	*QRP in Russia*
Rick Campbell, KK7B	*(TBA)*
Ed Hare, W1RFI	*Test Equipment & Methods*
Dave Cripe, NMØS	*Class E Amps for QRP*
Roger D. Hayward, KA7EXM	*(TBA)*

FDIM 2009 BUILD-A-THON

The buildathon is now integral part of FDIM. Feedback on past buildathons has been extremely positive. We have conducted the buildathon on Thursday after the seminar, as well as on Friday afternoon, with the preference for the event split evenly between the two. The past two years we have held it on Friday. This year, we will return to Thursday after the seminar or roughly 4:30 PM to 8:00 PM on Thursday, May 14, 2009

In past years, both QRP vendors and QRP Clubs have hosted this event. This year's Buildathon will be hosted by both the GQRP Club and the QRP ARCI. The project this year is for beginners and will focus on the theme of building basic skills with a manhattan style project. Participants will learn basic soldering skills, toroid winding, manhattan techniques and the use of some basic test equipment. When you finish, you will have a VXO controlled 40 meter direct conversion receiver.

Past year's participants found many uses for Buildathon projects. This year's project is an equally useful as it will give beginners a chance to build and use a simple radio.

The Build-a-thon will be held on Thursday, May 14, 2009 from 4:30 PM EDT to approximately 8 PM EDT. Registration for the event is $30.00. This will include all the parts for the project and Elmering as needed. We may ask some of you to bring wire cutters, a needle nose and a small iron to help with the assembly. This will be based in part by whether you are flying or driving to the event.

To register, please check buildathon on the FDIM 2009 registration form and follow mailing instructions on the form. You will receive confirmation of your spot in the Buildathon. Or you may register on line at the www.fdim.qrparci.org by following the links to FDIM 2009, and filling out the electronic registration for FDIM 2009 and checking "Build-a-thon."

There are a limited number of seats for this, so please register early. First come, first served. For more information, see:

http://www.fdim.qrparci.org
or contact Ken,W4DU: w4du@bellsouth.net

Information subject to change

FDIM XIV 2009

FDIM — Four Days in May

May 14-17, 2009

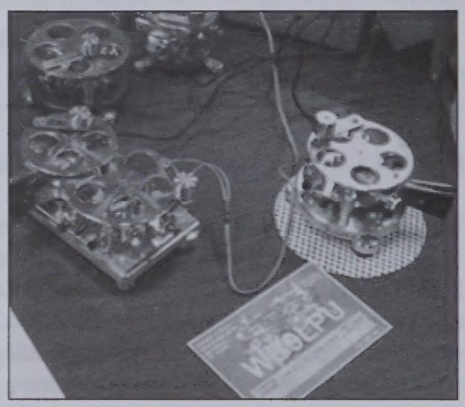
The Premier North American QRP event of the year!

Get it on your calendar now! Thursday-Sunday, May 14-17

If you haven't attended FDIM before, this is the year to make it your first. QRP-ARCI is sensitive to the first time attendee and will try hard to make your first FDIM as fun and interesting as possible. We will also have spouse/guest activities.

Registration and getting acquainted begins on Wednesday evening. Seminars are most of the day Thursday, with "meet the speakers" and an open room for some casual show and tell, vendor displays and plenty of time to swap tales that evening. We will also host a Build-a-thon Early Thursday Evening. Most of Friday daytime is open to attend the Hamvention® and visit the QRP-ARCI Toy Store. This year we will open the Banquet for Vendors and some other learning experiences. Friday evening activities usually include "show and tell," vendor displays and maybe a judged home brew contest. Most of Saturday is again open for the Hamvention, and we have a great social event, our annual banquet and awards presentation. There will be plenty of door prizes that evening. Sunday is more Hamvention, and check-out.

Most of the speakers for the seminar have been contacted and confirmed. We'll have a "meet the speakers" social gathering after the seminar, where you'll have an opportunity to meet, question and discuss QRP with the speakers.



Don't miss out on the show and tell. You'll have an opportunity to bring out your QRP related projects and put them on display. Your contemporaries will have a chance to roam through the displays and see the excellent craftsmanship used in these special exhibits. We'll have a build-a-thon for a QRP project, a judged project contest and it shouldn't surprise you to find a contest or two during the weekend. We've had QLF, split paddle, and other fun activities in the past.

QRP related Vendors are invited to exhibit both Thursday and Friday evenings. We're sure you'll find many special FDIM discounts.

In the past, the hotel has been accommodating with discount meal tickets. You'll find fast food restaurants across the street from the hotel.

This is preliminary information. A complete schedule and list of activities will be posted on the web site as we move through the process.
Dress is casual for all events.

We will again be at the Holiday Inn, Fairborn, OH. Reservations and special room rates for FDIM will be available after the first of the year through www.QRPARCI.org. Remember, all discounted hotel rooms are released only through QRP-ARCI. Instructions will be posted as soon as the Hotel is ready to start processing our Room Block.

Questions or comments:

Norm Schklar, WA4ZXV
FDIM2008 Chair
fdim@qrparci.org,
Tel: 770-313-9410

FDIM 2009 Registration Form

Registration is available on-line at http://www.qrparci.org (preferred method).
This form is provided for those instances where on-line registration is inconvenient.

1. Fill in the form

2. Mail Payment to: Jack Nelson, 1540 Stonehaven, Cumming, GA 30040 USA Make check payable to: QRP ARCI

PLEASE PRINT LEGIBLY (Your Badge will reflect your writing)

Your Name: First or Given _____ Last or Family _____ Seminar QTY __ @$40 = $

Callsign: _____ Banquet QTY __ @$30 = $

Email: _____ Buildathon QTY __ @$30 = $

Telephone: _____

Amount Included(includes additional below): $

Day of arrival | Wednesday | Thursday | Friday | Saturday | Don't Know (circle one)

Plan to Stay at | Holiday Inn | Other (circle one)- For hotel reservations please visit rooms.qrparci.org

Do you plan to enter an item in: | Show and Tell |Homebrew| (circle as necessary)

Payment is included with form ☐ (Please check the appropriate box)

Your First FDIM? ☐

Ok to contact me to help at FDIM ☐

Please help with our planning by completing these items.

I plan to participate in the Show and Tell ☐

I plan to participate in the Homebrew Contest ☐

I am interested in spouse activities ☐

Additional Registrants ☐

Name	Callsign or Guest/XYL	Seminar $40.00	Banquet $30.00	Buildathon $30.00
Name: First or Given _____ Last or Family _____		☐	☐	☐
Name: First or Given _____ Last or Family _____		☐	☐	☐
Name: First or Given _____ Last or Family _____		☐	☐	☐

For the latest FDIM information, please visit http://www.fdim.qrparci.org

Questions, please contact Norm, WA4ZXV at fdim@qrparci.org

FDIM 2009 Vendor Nights / Sponsor Sign-up Form May 14-17 2009

Registration is available on-line http://www.qrparci.org (preferred method)

This form is provide for those cases where on-line registration is restricted

Date completed: _____

PLEASE PRINT LEGIBLY (Your Table Sign will reflect your writing)

Table Name (Company or Club): _____

Contact Info:

Your Name: _____ Callsign: _____

Email: _____ Telephone: _____

I plan to exhibit on: | ☐Thursday Evening | ☐Friday Evening (Please check)

Sponsor but **no Exhibit Space is Required** (check here) ☐

Electricity is required: Y/N ☐ Number of Tables Requested: ☐

Tables are somewhat limited, we'll do the best we can if you need more than 1

I will be donating a door prize: Y/N ☐

Door Prize contributions will get you listed as a Sponsor

Brief description of donation: _____

Estimated Value $: _____

Information for your listing on the QRP-ARCI web site as a Vendor / Sponsor

Web Site: _____

Advertised Address: _____

Advertised Phone: _____

Advertised Email: _____

Link to Logo: _____

Link to standard banner (468x60): _____

Product Line Description Short Paragraph:

Questions or comments to Norman Schklar, WA4ZXV, norman@schklar.com or 770-840-9664

Donated items that need to be shipped prior to the week before FDIM should be sent to:
FDIM C/O Norman Schklar 480 N. Peachtree Street, Norcross, GA 30071 No Later than May 3, 2008

Items sent to the hotel should arrive no sooner than May 9, 2009 and should be shipped to:
Holiday Inn ATTN:FDIM Chairperson, 2800 Presidential Dr., Fairborn, OH 45324

FDIM XIV 2009

Thursday a full day of Seminars

Saturday Evening Awards Banquet Door Prizes

Four Days in May
May 14-17 2009
Thursday thru Sunday

Friday spend some time with vendors or attend one of our training sessions

- Registration and getting acquainted begins Wednesday evening.
- Seminars are most of the day Thursday, with "meet the speakers" and an open room for some casual show and tell and plenty of time to swap tales.
- Friday daytime is open to attend the Hamvention® and visit the QRP-ARCI Toy Store.
- Friday afternoon and evening activities usually include "show and tell", vendor displays and a judged home brew contest.
- Saturday is again open for the Hamvention, and we have a great social event, banquet, awards presentation and door prizes that evening.
- Sunday is the Hamvention®, and check-out.

Thursday Evening Meet the Speakers

Friday daytime, take a break attend the Hamvention

Thursday Evening Casual Show and Tell

Wednesday evening Registration and get together

Thursday Afternoon Buildathon

Friday Afternoon and Evening Vendor Night Judged Competition Home Brew Displays

Saturday Morning Off to Hamvention or see the sights

FDIM Registration and Hotel Reservation available on www.qrparci.org

Much More! Watch the web site www.qrparci.org

Guest/Spouse Program

Home Brew Contest	Door Prizes
Build-a-thon	Discounted Hotel Rooms
Banquet	Complimentary Breakfast
Seminars	Hamvention just across town
Meet the Speakers	Nearby Restaurants
Vendor Displays	New Product Announcements
Discounted QRP Products	Spouse Program

This is preliminary information. Some changes will most definitely occur.
Please check the web site, www.qrparci.org, for the latest details and registration information.

12.08.2008

Idea Exchange

Technical Tidbits for the QRPer

Mike Czuhajewsi—WA8MCQ wa8mcq@verizon.net

In this edition of the Idea Exchange:

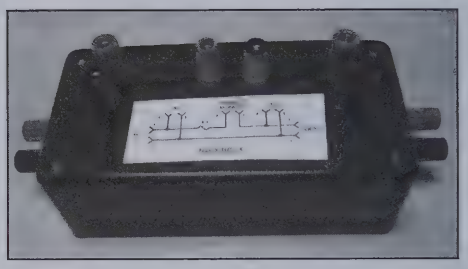


Figure 1—The BBOB (Battery BreakOut Box).

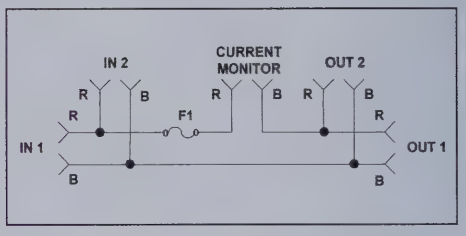


Figure 2—BBOB schematic diagram.

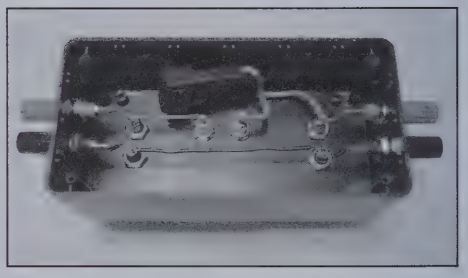


Figure 3—BBOB internal photo.

Battery BreakOut Box

Getting close to yet another speed limit (depending on what state you live in), Joe Everhart, N2CX, presents #69 in his endless string of Quickies—

Much like audio and RF, connections between various assemblies' power connections often involve multiple connector types. For more or less permanent interconnection it's convenient to build dedicated cables with the correct corresponding terminations. However, for temporary setups or testing it's clumsy to whomp up a special cable that might never be used again.

One solution is to build up an interface cable with multiple connector types wired together. A handy variant of that is to run the cable through a box that also has test points that give access to individual leads in the cable for testing or monitoring.

Faced with interconnecting my solar cells and other charging sources with rechargeable battery packs, and battery packs with various pieces of gear, all with a variety of incompatible connector types, I've often thought that a universal breakout box would be quite useful. Having one would eliminate haywire lashups involving alligator clips, screw terminal strips and strange kludge strings of connector adaptors.

As usual I thought it over for an extended period to make it "just right." I wanted to include every type of power connector I use, such as multiple sizes of coaxial power plugs and jacks, cigar-lighter plugs and jacks, alligator clips, screw terminals for unterminated wires and five way binding posts for banana plugs or spade lugs. Naturally the ideal breakout box would also include an extension to Powerpole connectors, it would allow current monitoring in any lead, voltage monitoring of each connector and a fuse for each connector. That thinking got completely out of hand and I never got around to making the perfect solution.

I finally realized that rather than trying for perfection, it made much more sense to scale back expectations and make a simpler, more practical breakout box. The result is what I call the BBOB for Battery BreakOut Box.

The photo in Figure 1 shows the final result. It is basically a number of 5-way binding posts (one of my favorite components—see Ref. 1) mounted in a plastic box. Simple adaptor cables connect to the binding posts either by stripping the wire ends or using banana plugs or spade lugs. The other end of each cable is terminated in one of the connector types above.

The schematic diagram in Figure 2 details the internal wiring. I arbitrarily called the connections at one end the INPUT side and the other OUTPUT. Positive voltage connections to input and output red binding posts labeled "R" and negative connections are labeled "B" for black. On both ends two sets of binding posts are paralleled to allow either using parallel cables or a single cable or voltage monitoring. F1 is a protective fuse to lessen the likelihood of burning wires due to inadvertent short circuits. The positive wiring is taken through another set of binding posts to allow for current monitoring or use of a series resistor for current limiting. These CURRENT MONITORING binding posts should be shorted together for normal use.

Figure 3 gives an internal view. There is nothing really special about the wiring

beyond using proper wire size and taking care to insulate everything to prevent internal short circuits. I used 20 gauge solid insulated wire since I expect to handle only low currents. Larger diameter wire would be better for more than a couple of amps although it is difficult to handle inside a small box during construction. The ugly rectangular "blob" is a blade type fuse holder. Its stiff leads hold it securely enough without need to mount it to the case. It is a good idea however to tape a spare fuse inside the box for those "rare" occasions that you manage to blow out the main fuse.

All of the components can be obtained from your local Radio Shack if you care to duplicate the BBOB. Here is a list:

- 270-1805 Project Box
- 274-662 Input and output binding posts
- 274-550 Current monitoring binding posts—These are grey in color with read and black tips to distinguish them from the power connections
- 270-1274 blade type fuse holder
- 270-1201 blade fuses
- 278-1222 20 gauge hookup wire

Showing Radio Shack parts in this article is not necessarily an endorsement of that source, merely an indicator of a convenient way of getting the parts. You can surely save money by buying elsewhere if the convenience of buying locally is not important to you.

Figure 4 shows several of the BBOB adaptor cables I've constructed. From left to right, top to bottom they are:

- 2.1 × 5.5 mm coaxial power plug using a RS 274-1569 Type M plug
- 2.1 × 5.5 mm coaxial power jack using a RS 274-1582 Type M jack
- Cigar lighter adaptor (CLA) plug using a ham flea market plug
- CLA jack using a dual jack scrounged from a broken mobile power adapter

Not shown (I misplaced it!) is a cable terminated in Radio Shack 64-044 terminals that connect directly to a 12V sealed lead acid battery.

Doubtless, gentle reader, you will have a special connector not on this list so feel free to make our own special set. Be very careful to either color code the free end leads (red for positive and black for negative) or otherwise clearly mark them so that they can be connected correctly.

Figure 4—BBOB interface cables photo.

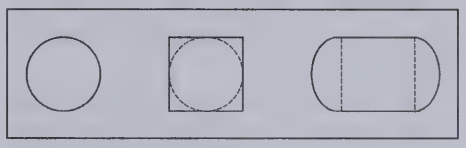


Figure 5—Making the holes for the binding posts (left to right).

The BBOB was originally built to connect a 1.5W solar panel to a 12V gel cell power pack. The solar panel leads are terminated in a CLA plug while the power pack has both a coaxial power charging jack and a CLA jack. Charging current can be monitored by connecting a suitable current meter between the Current Monitor posts. Battery voltage is monitored by connecting a voltmeter across the Output 2 posts. A more permanent solar panel to battery hookup is described in Reference 2. A second solar panel can be connected in parallel using the dual CLA jack cable.

Somewhat along the same lines, I've used the BBOB to charge various NiCad, NiMH and gel cells when a proper charger was not handy. To do so I connect a power supply to the INPUT side and the battery to be charged on the OUTPUT. The power supply has to be rated at least 3 volts more than the battery. A resistor across the CURRENT MONITORING terminals then sets the charge current. A current of no more c/10 (where C is the ampere-hour capacity of the battery) gives a safe, slow charge. Alternatively an active charging circuit could be connected between the above terminals and the negative side connected to the black binding post on the INPUT or OUTPUT side.

Quite naturally the BBOB can be used to temporarily interconnect any power source and piece of equipment with oddball connectors using the interface cables. Additionally the extra pair of OUTPUT terminals provides a way of powering an accessory item as well. Just don't get carried away and try to draw more than a couple of amps, since the wiring and terminals will probably be overstressed.

Finally, a word or two on mounting the 5-way binding posts. If you look at the bottom end you can see that they are not square in cross-section. Two sides are flattened and the ends are rounded in a back to back "D" shape. This is intentional so that they won't rotate in their mounting holes when you tightly twist the top piece. Old Timers know this but newbies may overlook it. Look carefully and you will also see that the side hole in the top of the binding post shaft is in line between the two flat sides so that the hole can be aligned as desired when the binding post is installed. I know of no commercial punch to make a proper mounting hole so you need to follow a three step process to do so manually:

Drill a hole in the mounting panel the same diameter as the flat part of the threaded end of the binding post. (Figure 5, left side.) You can use calipers or a good machinists rule to measure the flat-to-flat thickness.

Now, using a small flat needle file flatten the sides of the hole to make a square hole no wider than the original diameter (Figure 5, center).

Finally, use a half-round or rat-tail file to round out the two ends to accommodate the double-D shaft (Figure 5, right).

If all this seems like too much work I described other methods of making the functional equivalent of the right shaped hole in an earlier Quickie (Ref 3).

References

All N2CX Joe's Quickies, included in the Information Exchange column in the *QRP Quarterly,* especially:

Quickie No. 23, "In Praise of Knurled Nuts," Oct 1997.

Quickie No. 49, "D-ing your BNC's and 5WPB's," April 2004.

Quickie No. 17, Watching Your I'S and V'S," April 1996.

—DE N2CX

Choosing Capacitors

A while back, someone on an online QRP discussion forum asked for guidance on what types of capacitors to choose for QRP applications. One of the people who responded was Paul Harden, NA5N, who posted this—

Funny this capacitor thread popped up. The ARRL has asked me to give them a hand reworking the Components chapter in the next Handbook. I have been working on the capacitor section for two days, and most of today, trying to figure out how to make capacitor selection easier to understand. That is, how to answer exactly the questions (and confusion) you posed. You're not alone!

Capacitors clearly comprise the largest choices of component selection. All of the varieties and specs can seem to be daunting. There are NP0, X7R, Y5V, 5%, 10%, ceramic disc, multilayer ceramics, multilayer films, metalized films, silver micas, disc caps, encapsulated, epoxy coated... well, you get the drift (pun intended). The EIA (Electronics Industry Alliance) has actually done a good job making capacitor selection easy, but seemingly overlooked in most literature.

Look at your DigiKey or Mouser catalog. For most capacitor types, whether ceramics, films, poly-something or another, the catalogs will list either the tolerance (5%, 10%, 20%) or Class (Class 1, 2, 3 or 4), or the temperature codes (NP0, X7R or X5U). Understanding these three things answers 95% of your questions.

(Technically, the Type 1, 2, 3 and 4 EIA classifications are for ceramics only, not films. However, some film manufacturers are now using the designations, though outside of the EIA.)

CLASS 1 are 5% or better tolerance capacitors. These are the most accurate values, and stable in long term drift and temperature coefficient. NP0 (same as the EIA designation C0G) is the dominant example of a Class 1 capacitor. Class 1 caps should be used in sensitive frequency determining circuits, such as a VFO or tuned circuit for stability and minimal drift over temperature. It makes very little difference whether a particular Class 1 5% capacitor is ceramic or a film type. Only the exotic polypropylene 2% tolerance caps (and other expensive types) are a bit better, but are still Class 1 for the top level of stability.

CLASS 2 are 10% tolerance caps with a fairly stable temperature coefficient, but not as good as Class 1. A capacitor with a temperature code of X7R is an example of a Class 2 cap. They can be used in frequency determining circuits where the drift vs. temperature is not overly critical, such as the feedback and tuning caps in a crystal oscillator or in many tuned circuits. Most tantalum caps are also 10% tolerance Class 2.

CLASS 3 are also 10% tolerance caps, but with a worse temperature coefficient than Class 1 or Class 2. Y5V and Y5U are two common Class 3 capacitors. They should not be used in sensitive frequency determining circuits. They are generally cheaper than Class 1 and quite suitable for bypass caps, interstage coupling, and most other uses in a circuit.

CLASS 4 are the least preferred with tolerances of 20% or more. With modern manufacturing techniques, it is rare to find a Class 4 capacitor today. The exception are the aluminum electrolytic caps. These are generally Class 4 20% tolerance, which is more than suitable for their intended applications. (You're not making tuned circuits with electrolytics, are you?)

So, to make it even simpler, here's what to remember or jot down:

Class 1 = 5% or better = NP0/C0G = the best class of caps
Class 2 =10% = X7R = next best class of caps
Class 3 =10% = Y5U/Y5V = common, run-of-the-mill caps
Class 4 = 20% = don't use unless an electrolytic

NP0 is actually an obsolete designation. The old temperature codes, such as P50 for +50 ppm, N100 for –100 ppm, or NP0 for zero ppm/degree C, are no longer used, replaced by the EIA codes, C0G, X7R, etc. However, the NP0 designation is so engrained as the "zero drift capacitor" that most manufacturers continue to use the designation. QRPers certainly still do!

If You're Buying New...

Select Class 1 (NP0/C0G) for caps in frequency determining circuits. Use the cheaper Class 3 for most other applications.

If You're Using Old Junk Box/Surplus Caps...

For frequency determining caps, use only if you know it is an NP0 type. If not labeled, NP0 ceramic discs usually have a black stripe or paint blob at the top. Assume all other capacitors in your junk box are Class 3. Use them for bypass caps, interstage coupling, etc., but not as the frequency determining caps in a VFO. If you happen to have some really old paper and wax tubular caps, or those really nifty JAN postage stamp caps, you can figure they're at least 20% off the marked value by now, and thus a Class 4. They might be great for impressing the FDIM buildathon judges, however.

So get out your DigiKey or Mouser catalog and put this to use. Most pages will indicate whether the cap is an NP0, X7R or Y5U/Y5V (most common types). If it doesn't, look at the tolerance column. If it's 5%, it's a Class 1; if it's 10%, assume it is Class 3 unless otherwise stated. Of course, many pages also say "Class 1 or Class 3." The tolerance column, 5% or 10%, will tell you whether it's Class 1 or Class 3.

Again, use Class 1 for frequency determining caps; Class 2 or 3 for most all other applications.

So what about the ceramic, metalized film thingie? It really doesn't make much difference. A Class 1 is a Class 1, regardless of the dielectric used. Ceramics are the most stable, but the manufacturing process makes them a bit more expensive. All the multilayer film types are just different methods to manufacture a cap that has a certain capacitance and generally in a smaller package and cheaper compared to ceramics. Most surface mount caps are multilayer films with a ceramic coating. This smaller film size vs. ceramics also makes some of them sensitive to temperature changes. This is why you check to see if the film caps are a Class 1, 2 or 3 as the application requires. And finally, some multilayer film caps use special coatings to achieve very accurate capacitances and improved temperature coefficients. These will be Class 1 and can be significantly more expensive than ceramics (like polycarbonates or silver micas). But, they're well worth the price if you're putting something into orbit

The one exception I can think of to the above is to use a Class 1 or 2 cap with a low ESR (equivalent series resistance) in active filter audio circuits. You want a cap whose value will change very little over

time (Class 1 or 2) and has a low ESR. A high ESR cap in an active filter (which usually has unity gain) will gobble up much of the audio signal, rendering the circuit nearly worthless. The difference between good caps and mediocre caps in an active filter is like night and day.

Hopefully, I will have some useful illustrations and tables to show all of this for the handbook. The ARRL does seem to be motivated in changing the Components Chapter in the handbook to be more useful for homebrewers, and to encourage new homebrewing. If you have any ideas on what should be changed, added, or presented in a different way, let me know. I have already submitted a fair number of suggestions ... like replacing the 3 pages of light bulbs with some LEDs and good toroid information. So far, I have received good support from Newington to get the Components chapter back to a good and updated reference source. I know other chapters are getting the same level of attention (with several notable QRPers involved!).

My next head scratcher will be how to make the toroid and semiconductor data more concise and useful.

I hope the above answers most of your questions. Consider your junk box caps as 10% Class 3 general purpose caps unless you know otherwise.

—DE NA5N

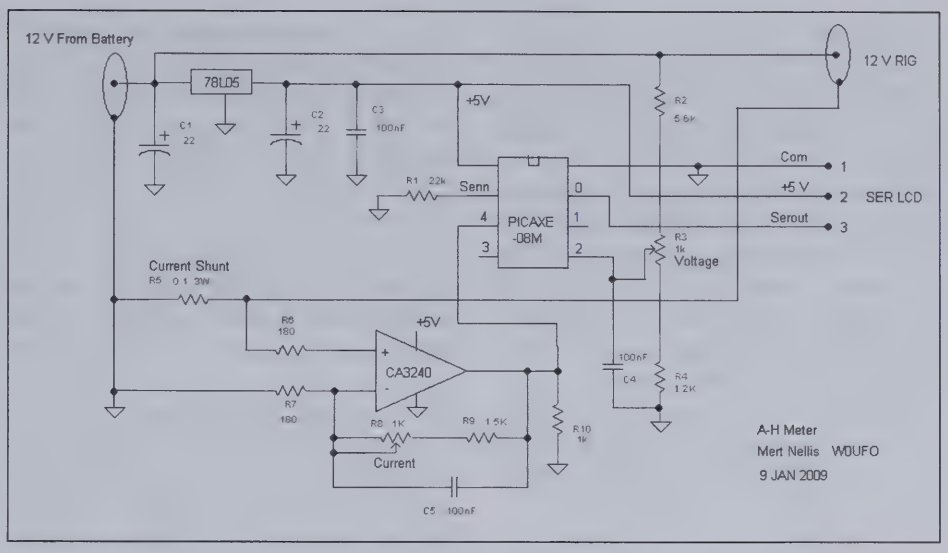


Figure 6—Schematic of the Amp-Hour meter.

A PICAXE Ampere-Hour Meter

Mert Nellis, WØUFO, sent this along—

I've been thinking for some time of an idea for an Ampere-Hour meter for monitoring the energy used from my radio battery so recently, while doing some work with the PICAXE (Ref. 1) micro-controller, I developed this scheme. Although there are some other meters available, cited in references 3 and 4, this PICAXE version has some differences. Once the A-H measurement was solved, it became apparent that the PICAXE had extra capability allowing current and voltage to be displayed as well. The scheme may be adapted for use by other micro-controllers.

How it works

Figure 6 shows the schematic of the Amp-Hour meter. Current from the battery is measured using a 0.1 ohm shunt resistor. Four amps produces 400 mV across this shunt and is amplified by a 10x op-amp to produce 4V, a useable maximum value for an analog to digital converter. To understand the calibration and operation of the A-H meter, think about the 1 amp point of operation.

If the current is constant at 1 amp and sampled 1,000 times per hour (every 3.6 seconds) then each sample represents 1/1000 of an amp-hour or 1 milliampere-hour (mA-H). If ten of these samples are accumulated, 10 mA-H has been delivered. This is the basic idea of accumulating (integrating) the current with time, however the PICAXE was fast enough to make 10K samples per hour so that the base sample could be 0.1 mA-H (100 µA-H).

Using a PICAXE-08M

Looking at the PICAXE-08M specifications, the 16 bit word length allows a sample accumulation to over 65,000 in decimal which, if accumulating mA-H units, would represent 65 A-H maximum. Samples could also be counted to 65,000. The processor speed is such that 10,000 samples per hour (one each 0.36 seconds) could be used to give a fairly accurate integration of the current and two ADC's are available which allows both current and voltage to be digitized. The counting of samples is helpful when calibrating and checking operation.

The PICAXE program is shown below with remarks explaining each step. It starts with a pause to allow the serial LCD to initialize and then a loop is started that digitizes the voltage analog of the current and scales it to represent milliamps. The loop is timed for 10K readings per hour so that each sample represents a 100 uA-H of charge. These samples are accumulated in memory for total charge. The loop is ended after 5 samples so that a read-out to the LCD can occur at a reasonable rate. Also, within the loop, the 100 uA-H samples are allowed to accumulate to 1,000 and then a 1 mA-H memory is incremented beyond that.

The number of samples are counted so that this count can be checked with time to calibrate the sample rate. The pause provided within the loop can be adjusted to obtain the required sample rate of 1000 per six minutes (10K per hour). The readings can start using µA-H and change to mA-H readings when required.

The 10 bit ADC (analog to digital converter) uses the supply voltage as a reference. The supply voltage should be well filtered and regulated. With a 5 volt supply, the ADC reading for 1 volt produced by 1 amp is approximately 200 units. This was calculated by multiplying the 10 bit decimal value, 1,023 by 1V / 5V. We expect an ADC reading of 800 at the maximum 4 Amps. The ADC reading divided by 2 scales the sample to 100 uA-H at 1 amp and then multiplied by 10 to make it 1000 mA for the current reading. The current is displayed as mA.

To read the voltage of the battery (12 to 14V), it was necessary to divide the voltage down to the 3 to 5 volt range which digitized to the 600 range and scaled 2x for a 1200 reading and then divide by 10 to change it to decivolts around 120. It was too inconvenient to handle a decimal point

so decivolts are used.

A read-out for the numbers gathered by the PICAXE was the biggest problem and, to keep things simple, I chose a serial LCD to do the job. A 2 x 16 LCD was used to display the measured current in mA, the Ampere-Hours in mA-H (µA-H for small values), the voltage in deci-volts dV, and the sample-count (lower left, useful for calibration). If the count were divided by ten, it would equal millihours elapsed time. The picture of the LCD (Figure 7) shows the appearance of the display. A serial LCD kit (ref. 2) is available that adds to the building experience.

Calibration

Calibration for A-H consists of two adjustments, the current reading and the sample rate. The current can be calibrated by supplying a known current, like 1 amp, to the 0.1 ohm shunt. 1 amp will produce 100 mV across the shunt that can be read on the 200 mV scale of a VOM. Adjust the gain of the current op-amp so the LCD read-out shows 1000 mA. The sample rate requires the use of the sample-count provided. Time the operation so that 1,000 counts occur in 6 minutes. The program has a pause to make the sample time cor-

A-H Meter Program

```
'Measures current, voltage, Amp-Hours and counts samples
    '0-4 Amps, 0-14 Volts, 0-65 AH

pause 3000                          'allow serial meter to initialize
Main:
    For b6 = 0 to 4                 'count for readout after 5 samples
        readadc10 4, w0             'get current reading

        if w0<10 then               'allow for zero drift
        w0=0                                'calibrate so w0 = 200 at 1amp current
        endif
        w0=w0/2                             'scale to 100 = 100uA-H if sampled each 0.36Secs
                                            '10,000 samples/Hour
        w1=w1+w0                            'accumulate uA-H
        inc w4                      'count readings to be used for Cal.

        if w1=>1000 then                    'accumulate to 1000 uA-H= 1mA-H then
            w1=w1-1000                      'save excess to accumulate uA-H
            inc w2                  'accumulate mA-H
        endif
        serout 0, T2400, ("?y1?x00")        'cursor start of 2nd line
        serout 0, T2400, (#w4)              'display count
        pause 280                                   'time interval, adjust for 10K readings/Hr
                                                    '1000 counts in 6 min.
next b6
        w5 =w0 * 10                                 'current reading scaled to mA
        serout 0, T2400, ("?f")             'clear screen cursor home
        serout 0, T2400, (#w5)              'mA reading
        serout 0, T2400, ("mA?y0?x08")      'mA, set cursor for A-H to follow
    if W2=0 then                            'accumalating first 1000uA-H.
        serout 0, T2400, (#w1)              'uA-H readings to meter
        serout 0, T2400, ("uAH")  'units
    endif
    if W2=>1 then                           'accumulating over 1 mA-H
        serout 0, T2400, (#w2)              'mA-H readings to meter
        serout 0, T2400, ("mAH")  'units
    endif
         readadc10 2, w6                    'read the voltage sensor
        w6 = w6* 2                                  'scale for volts
        w6 = w6/10                                  'scale for deci volts
        serout 0, T2400, ("?y1?x08")        'cursor at 2nd row, 8th col
        serout 0, T2400, (#w6)              'reading
        serout 0, T2400, ("dV")             'deciVolts (no decimal point)
goto Main                       'repeat
```

Figure 7—Display with the A-H meter in operation.

rect. If the count is too high increase the pause, or if too low decrease the pause. The pause provided should be fairly close and the difference from meter to meter will depend upon the clock speed of each individual PICAXE.

The calibration of the voltage can be done by using a VOM to measure the voltage and adjusting the voltage divider until the LCD dV equals the VOM reading.

More Sensitivity

For QRP operation, it may be desired to have a full scale current of 1 or 2 Amps. The shunt value can be increased and the current amplification increased to obtain around 400 mV at the desired current. For example, for 1 amp the shunt could be increased to 0.33 ohms to get 330 mV and the current amplification raised to 12.1 to get 4V for ADC. At 4V, the ADC will be 800 so a scale factor of 8 must be used in the program to produce 100 which can be used as 100 µA-H (same as before) and then multiplied by 10 (as before) to get 1000 mA for a reading. Thus the circuit and program have the flexibility to handle almost any desired measurement range and less than 500 mV need be lost on the shunt. The same principles can be applied to changing the voltage measurement range.

References:

1. PICAXE, www.rev-ed.co.uk/picaxe

2. Serial LCD Kit, K107, LCD 118 2400, www.wulfden.org/theshoppe/products.shtml , Brian Riley, N1BQ

3. A-H Meter, www.mtmscientific.com/ampkit.html

4. A-H Meter, www.members.optusnet.com.au/frankwinter, Frank Winter, VK4BLF

—DE WØUFO

WA8MCQ note—if you're interested in reading a bit more about this chip, you can dig out the Summer (July) 2007 issue of the *QRP Quarterly*. Joe Everhart's Quickie #62 was titled PICAXE Panel Meter.

Thoughts on Simple Projects

I've always had a certain point of view about simple projects, and it would appear that a lot of others feel the same way. Rick Campbell, KK7B, posted these thoughts on the EMRFD online discussion group a while back.—

A common discussion on this site is the value of building a simple direct conversion receiver or crystal set as a beginners project before tackling a more complex receiver.

I was pondering that topic as I wandered among all the hundreds of recently constructed and restored boats at the Wooden Boat Festival in Port Townsend, Washington last year. My fellow wanderers fit into two broad categories: boat designer/builder/restorers, and boat admirers. I had many pleasant conversations with both types over the long weekend, though the folks actually working on a boat were clearly having more fun.

I also observed that some of the most experienced and knowledgeable boat designer/builders were working on the simplest, cleverest and smallest boats. They reminded me of my good friend Wes Hayward (W7ZOI), who has spent half a century designing, building and publishing everything from physics instruments to high performance receivers, spectrum analyzers, GaAs RFICs, and even design software. Last winter he designed, built, and experimented with an interesting crystal set.

So my enthusiastic recommendation is to build a direct conversion receiver or crystal set, but not just as a beginner's project. Every time I build a simple radio, I learn something new that I didn't even know I didn't know. When a radio or a boat is simple, it is possible to understand the problems and creatively solve them. That is true whether you are a beginner with just a little understanding, or an old salt with a half century of design experience. It is the simplicity of the circuit that maximizes both learning and enjoyment.

One of the high points of my weekend at the Wooden Boat Festival was an early-morning breakfast with a couple old salts discussing a boat built by "that hippie kid." They admired the simplicity of the design and workmanship, and were amazed that he'd slept aboard. I never did see the kid, but I found his boat—an ultralight Kevlar over wood frame sailboat designed to be towed behind a bicycle.

I try to alternate between ambitious projects that achieve something new, and simple projects that elegantly solve a single problem with a few components. Wes yawns when I describe my latest high-performance receiver project, but he got really excited about something I did one evening with one transistor and a diode. If you want to impress an old salt, keep it simple. Chances are he'll look at it for a few minutes and come up with some old wisdom that never made it into any textbooks. Something you didn't even know you didn't know.

—DE KK7B

Small Quantities of Bus Wire

Need some bus wire for homebrewing but don't want to have to buy a huge spool of it? Terry Fletcher, WAØITP, posted this recently to one of the online QRP mail reflectors—

I recently had a need for some bus wire and snipped component leads weren't long enough. The big supply houses have it for about $30/100 feet. Not wanting that much, I looked around in the hobby department at a big discount store.

Sure 'nuff they had some silver looking craft wire in 12 yard spools, for $3.48. It's called "The Beadery® CRAFT WIRE". It's 20 gauge, appears to be nickel plated copper, and takes solder well. It's a good substitute for bare, nickel plated bus wire.

—DE WAØITP

QRP Uses for Pill Bottles

From long time QRPer Jim Fitton, W1FMR—

The wires on 9V battery snap connectors are pretty fragile and break easily. I solved that problem by drilling a hole in the cap of a pill bottle and screwing on a phono jack with a solder lug as shown in Figure 8. Solder the black 9V wire onto the solder lug before mounting to prevent melting the cap. The 9V battery fits nicely inside the bottle and phono connectors are easier to use than those snap connectors.

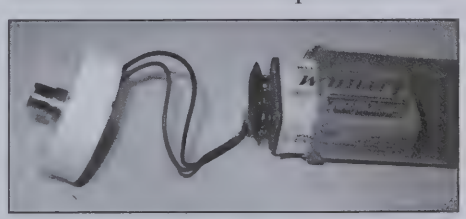


Figure 8—Pill bottle as a battery holder.

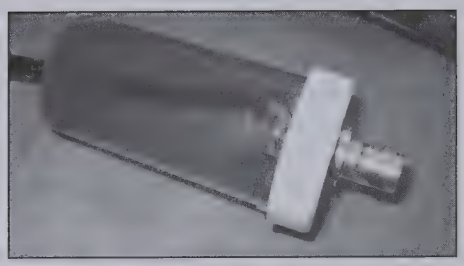


Figure 9—BNC socket housed in pill bottle.

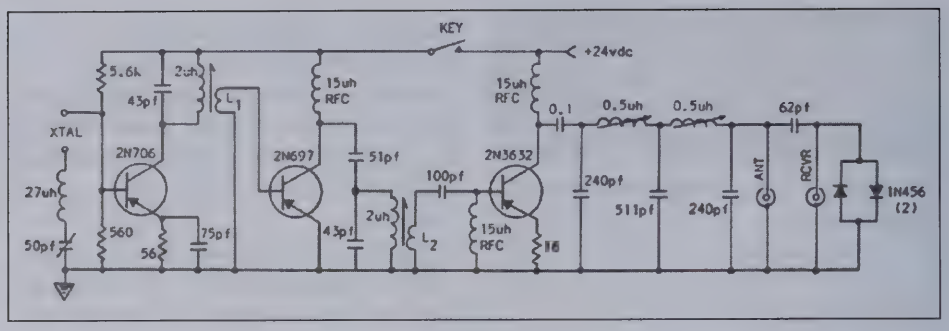


Figure 10—Schematic of the 20 meter K4OCE MiniRig.

To run some RG-58 cable through a tiny opening in the floor of my house that was too small for a BNC connector to pass through, the BNC was cut off, and the coax passed through the opening. A small hole was drilled in the bottom of a pill bottle (Figure 9) and the coax was pushed through. It was then stripped and tinned and the shield connected to a BNC grounding lug. A hole was drilled in the bottle cap and a BNC jack bolted to it with the soldered lug under the nut. The center of the BNC was soldered and the cap installed.

This makes a nice tight connection that can be made quickly and is cheaper and faster than installing a BNC and coupler on the end of the cable.

—DE W1FMR

QRP History—The K4OCE Mini-Rigs

Although probably unknown to most newcomers to QRP, Bob Rosier, K4OCE, was one of the modern day QRP pioneers and well known to readers of *The Milliwatt: National Journal of QRP* back in the early 70s. I swapped some e-mails with him a while back, and he sent along some photos of his old QRP rigs.

From his web page—"I never met a pile-up I didn't like! My very first DX contact was with KP4GN when I was a crystal-controlled novice running 45 watts. That was April, 30 1953, so I guess that is when I got the DX bug. I only had one crystal, and it was 3.731 MHz. Around 1965 I started experimenting with transistorized CW. transmitters. I wanted to try some DXing with low power. I remember that I couldn't find any transistor on the market at the time that would go to 10 meters, and even 15 was a problem. I did however find that I could get about 5 watts on 20 meters with a 2N3632. The transmitter design used a 2N706 oscillator, 2N697 driver, and a 2N3632 final."

Figure 10 is the schematic of his 20 meter rig, which is actually the second generation MiniRig, and Figures 11 and 12 show the top and bottom. One end has a connector for optional VFO input, not shown on the schematic; he said he used a signal generator as a VFO. If you look closely, the crystal is for 1000 kHz; a ham band crystal was not readily available when the photo was taken. The oscillator and driver transistors are in sockets on top, and the final is on the heat sink on the side of the box.

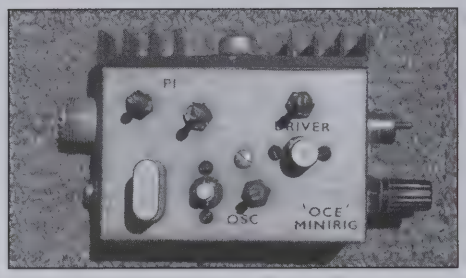


Figure 11—Top of the 20M rig from the 70s.

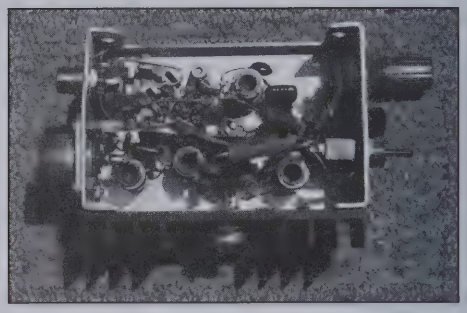


Figure 12—Inside the 20M rig, using standard QRP construction techniques of the era.

The underside reflects the homebrewing style used in those days; my own QRP rigs from that era have a similar appearance. Remember, this was years before Manhattan and "ugly" construction over unetched PC board stock. And note the use of slug tuned coil forms, another artifact of the times; although powdered iron toroids had been available for years, they were not yet in widespread use in homebrewing.

Bob used this rig to work 148 countries on 20M CW and also obtained the *CQ* magazine Worked All Zones award. The latter was in 1971 and was the first QRP WAZ.

His current DX total with QRP is 319 worked and confirmed, plus 11 deleted, for a total of 330 countries. Some of his other QRP achievements are the first QRP DXCC given by the *Milliwatt* magazine (1972), 1st place in the QRP category of the 1984 ARRL Field Day, achieved Worked All Continents in 42 minutes in the 1971 CQ WW DX Contest running under 5 watts output, and the ARRL Millennium Award in 2000, working 100 countries in 2 weeks running 5 watts.

Bob also has a personal QRP record of working ZL2AFZ while running 3 milliwatts in 1971. That's a very impressive achievement, in the vicinity of 3 million miles per watt based on a very rough calculation I did. He had these comments about it—

"The first generation OCE MiniRig with a pair of output transistors (schematic shown later) was used the most. It was 7 watts output. When I worked ZL2AFZ with 3 milliwatts, I had an attenuator that took 7 watts down to 7 milliwatts. He said he was still copying me and I didn't have any more attenuation to add, so I pulled out one of the 2N3553s and sent a short message which he repeated exactly. I carefully measured the output with the missing transistor, and it measured 3 milliwatts. I later took that rig apart (so I don't have a picture) and built the 2nd generation "OCE" MiniRig. If it wasn't for George (ZL2AFZ) this record wouldn't have come about. I would be operating and he would often break in and ask what power I was

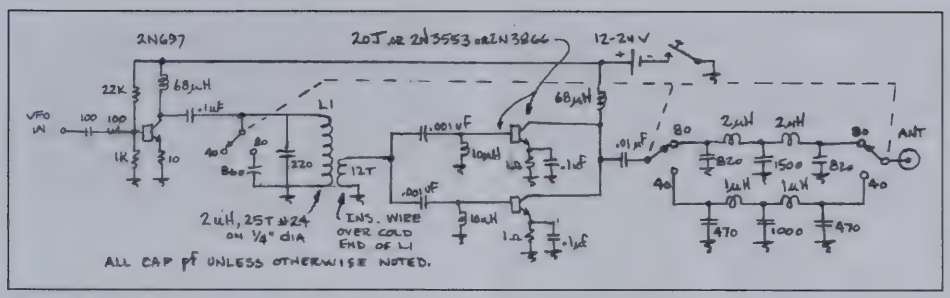


Figure 13—Schematic of the K4OCE 80/40M transmitter.

Figure 14—Top of the 80/40M rig. (Two of the transistors were not plugged in when the photo was taken.)

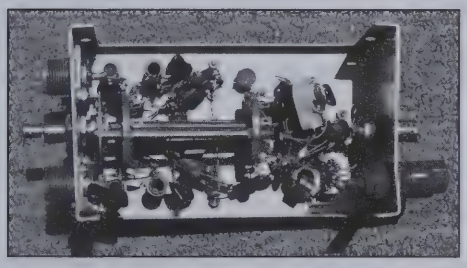


Figure 15—Inside the 80/40M transmitter.

Figure 16—This is one of the drawbacks to QRP rigs, where the heavy coax tail wags the dog (miniature QRP rig and miniature key).

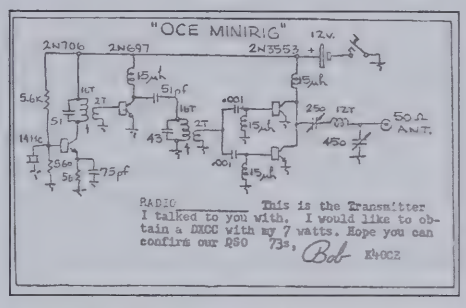


Figure 17—Schematic of the first generation OCE MiniRig, also for 20 meters. No photo was available.

running this evening. On the 3 milliwatt day, when he asked I said 7 watts and he said I was 589 so we decided to start lowering. It surprised both of us."

Bob said that when he left North Carolina for Texas he was off the air for about 15 years, and got active again around 2000 with the announcement of the ARRL Millennium Award. He said, "I miss the 4 element quad I had in NC, but I now I have a Cushcraft X9 that seems to work as well. Only need 10 more to get on the DXCC Honor Roll."

Bob later built a rig which was switchable between 80 and 40 meters, shown in Figures 13, 14 and 15. Unlike the 20M rig, this one operated with external VFO input only.

Bob not only used a miniature transmitter, he also used a miniature key with it which is actually a push button switch from an ancient Western Electric telephone relay test set. (I have one of those miniature keys myself, a treasured gift from K3TKS years ago.) Bob also provided the photo of Figure 16, to illustrate that there are drawbacks to QRP rigs. "Here is what I found one day I walked into the ham shack. [The] Rig was not heavy enough for the antenna coax." (The key is hanging below the rig.)

Bob also said, "I built all my units using transistor sockets so that I could experiment with several different transistors. Figure 17 is the first generation OCE MiniRig [the one used for the ZL2 QSO). I sent over 200 of these schematics to hams all over the world, and this generated a lot of interest. Many QSLs came back to me direct and with added notes and much interest."

QRP Remote Antenna Selector

Here's another application for the PICAXE microcontroller from Mert Nellis, WØUFO—

This is an antenna selector that can remotely connect a coaxial cable to one of eight different antennas. I use an 08M PICAXE (note 1) to transmit a serial code over a pair of wires to another PICAXE 08M that decodes the serial code to operate relays to connect the coax. The relays and BNC connectors used can be suitable for QRP power in the HF bands. One of the relays shown has 4 poles but two, two pole relays could be used in its place. I use a relay similar to Magnecraft Class 78 General Purpose, with a 12VDC 160 ohm coil, available in 4 pole double throw form from Mouser Electronics.

The schematic of the Local (master), Figure 18, shows three switches (or a decimal to BCD rotary switch) as input to the Local (sending) PICAXE . The master PICAXE decodes the BCD on its three input pins and sends a decimal number over two wires to the Remote (slave) PICAXE.

The remote, shown in Figure 19, uses the number received to operate three relays

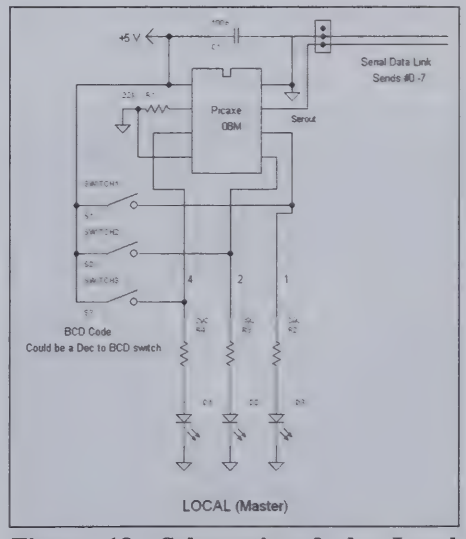


Figure 18—Schematic of the Local (master) portion of the remote antenna selector.

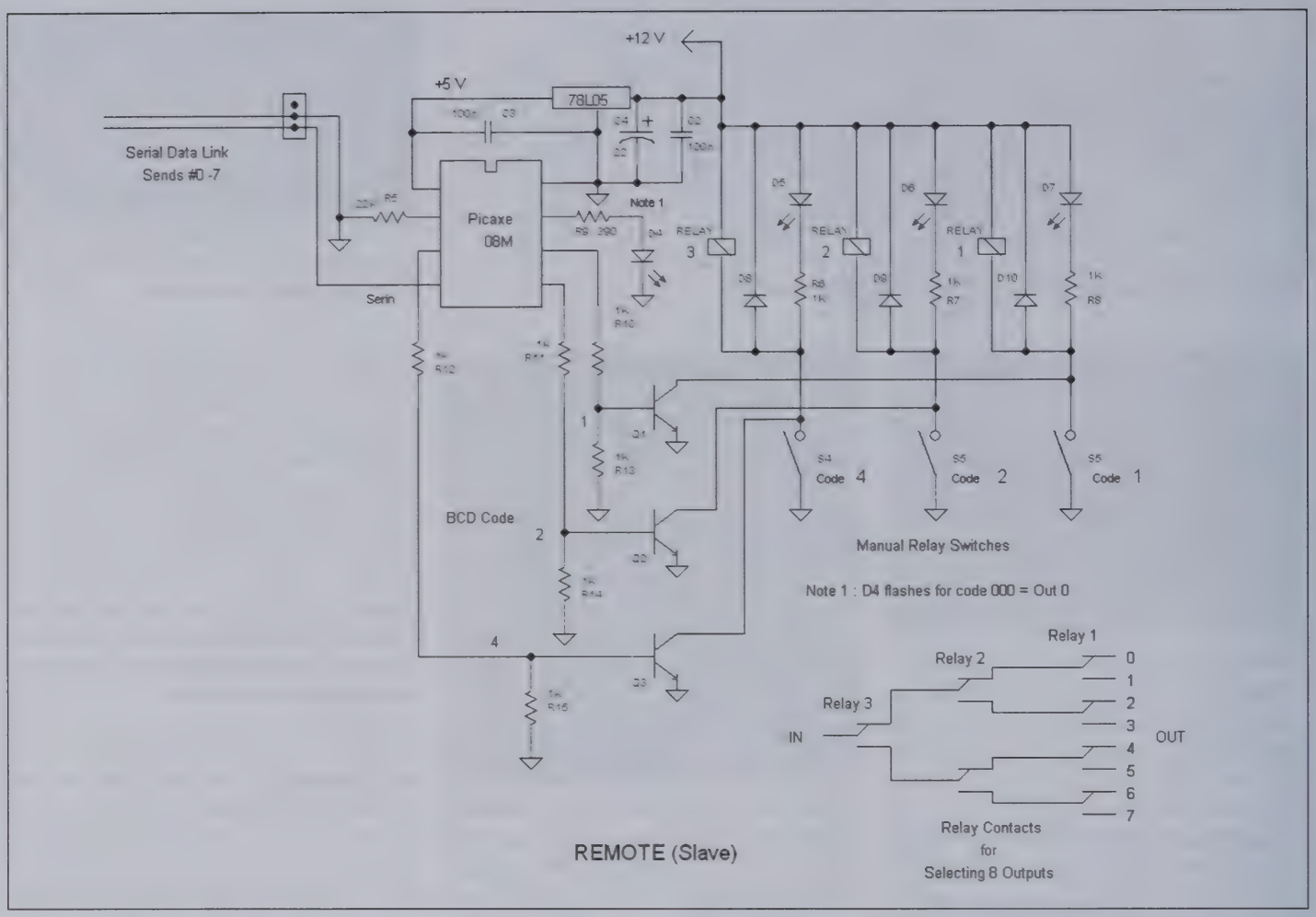


Figure 19—Schematic of the Remote (slave) portion of the remote antenna selector.

using a contact "tree" that connects the input coax to the selected output coax. The relays are operated in a three digit BCD code in reverse of the master to connect to 0 to 7 different output connectors. The serial interconnection is accomplished by directly connecting the "serout" of the master to the "serin" of the remote. The software does the coding, decoding and serial transmission.

The insertion loss for the relay "tree" shown was measured to be about 0.9 dB. The signal encounters three series relay contacts. If the extra relay cost can be tolerated, less loss could be obtained by operating eight individual relays with one set of contacts to make each connection or, ideally, operating eight low loss coax relays via an I.C. decode.

The PICAXE BASIC code for both the local and remote is shown on pages 24-25. A programmer and details on how to use it are available for download at the Picaxe web site (note 1).

The object of this project was to remotely connect a feedline to several antennas but this same scheme could be used for other projects requiring a remote control using a serial pair interconnection. Devices other than relays could be operated and more or fewer devices could be connected. A full byte can be transmitted serially so up to 256 devices could be selected.

Note 1: PICAXE microcontroller, www.picaxe.com

—DE WØUFO

Simple Code Practice Oscillator

Even though the Morse requirement has been lifted by the FCC there still appears to be interest in learning it. A CPO is a very handy tool for that, and is also useful for someone who wants to practice their CW. One of the online QRP discussion groups pointed me to this one, which is on the web page of Tom Sevart, N2UHC. You can see this and his other projects at: http://www.geocities.com/n2uhc/

(Thanks to K5EST for posting the URL for the CPO, which is:

http://www.geocities.com/n2uhc_2/code_osc.html)

This is a Morse code practice oscillator I built. The first homebrew project I ever built was a code buzzer like this, but unfor-

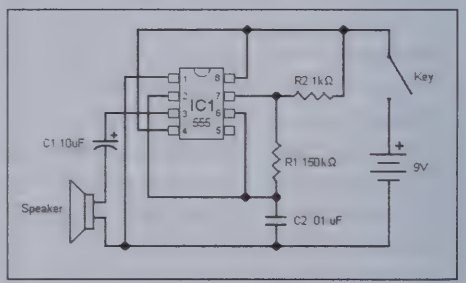


Figure 20—A simple CPO using the ubiquitous 555 timer chip.

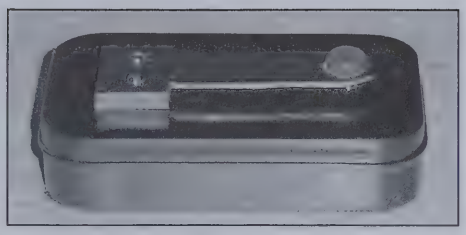


Figure 21—A key made from PCB stock is mounted on top of the Altoids box.

tunately I no longer have it. I found plans for a similar project in the August 2003 issue of WorldRadio in an article entitled "Simple Code Key For The Beginner" by Howie Krausse W5OM. Howie constructed a CW oscillator into an Altoids box with a straight key mounted on the lid. I constructed mine in the same way.

The circuit, shown in Figure 20, is a simple oscillator circuit based on a 555 timer IC. There are only a few components needed to construct it.

Parts list:

IC1- 555 timer
R1 - 150k
R2 - 1K
C1 - 10 uF electrolytic
C2 - .01 uF ceramic disc
Speaker
9V battery clip

Lowering the value of R1 will lower the pitch of the tone. A 150K potentiometer can be substituted to adjust the pitch. I used three 300K resistors in parallel. I used two because I didn't have a 150K resistor on hand, and used the third one to lower the pitch even further from what it originally was. The oscillator puts out a square wave, so it will sound better and less raspy with higher pitches than lower ones. A pot is the best way to find a comfortable pitch.

I cut the key out of a piece of PC board and mounted it to the lid with a couple of screws & nuts (Figure 21). I added a couple more layers of PC board to provide a gap between the key lever and the contact screw, which was insulated from the lid by means of a plastic washer. A rubber cabinet foot attached to the key lever acts as a knob. The board & speaker were attached to the inside of the tin (Figure 22) by double-sided foam tape. The Altoids box was given a coating of dark blue metallic paint.

The simplicity of this project makes it perfect for the new ham just getting into homebrewing. It will also act as a handy tool to practice CW skills.

—DE N2UHC

Figure 22—The CPO fits into the Altoids box with room to spare.

Soldering Iron Temperature Control

William Penhallegon, W4STX, shared this recently—

The "professional" kit building hams all seem to use one of the expensive temperature control soldering stations for their kit assembly. However, like most hams, I only have an ordinary soldering iron without any temperature control. Well, I actually have two irons, one rated at 25 watts and one rated at 40 watts.

In order to regulate the temperature of my soldering irons, I built a control unit using a rotary incandescent light dimmer. It is similar to the temperature control unit I found in the 2006 *ARRL Handbook* on the Circuit Construction, page 8.7. Figure 23 shows the schematic.

I used a 4-inch square metal box with a 4 inch square cover from Home Depot. My 6' cord and "snap-tite" cable connector also came from there and were put in one of the half inch knock-out holes in the box. The dimmer and the duplex outlet are mounted in the 4 inch square box cover. The dimmer controls only one of the two AC outlets. A jumper on the duplex outlet connects the hot terminals of the outlets together and it was removed.

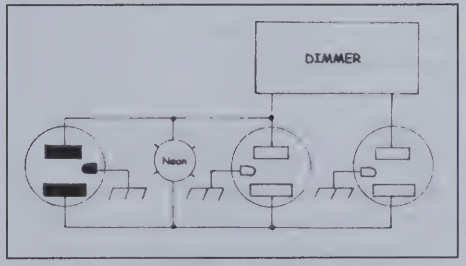


Figure 23—Schematic of the soldering iron controller.

The red neon 120v lamp assembly came from Radio Shack (# 272-0712) and fits in one of the four mounting holes in the cover of the box after the hole was enlarged slightly with a step drill bit. When the temperature control unit is plugged into a 120 VAC receptacle on my work bench, the red lamp is "on." It is in the upper left corner of the unit in Figure 24. My soldering iron is plugged into the AC outlet controlled by the dimmer. I occasionally use the other AC outlet for a lamp to give me additional light when I am soldering. Four rubber bumpers were added to the bottom keep the box from scratching my desk top.

What temperature should the soldering station be set for and how do you set it without high temperature measuring equipment?

Don Wilhelm, W3FPR, in his "Good Soldering" article in the Fall 2006 QRP Quarterly, mentions he had three soldering stations that did not agree with the temperatures indicated by the dials. He also describes his method of determining the proper temperature for soldering. He "times" a few test soldering joints using inexpensive resistors and counting "one thousand one," "one thousand two," etc and if it takes longer than 3 seconds the temperature is too low and if it takes less than two seconds the temperature is too high. This article may be reviewed for good soldering techniques and recommendations.

This temperature control unit is an inexpensive way to gain control of your

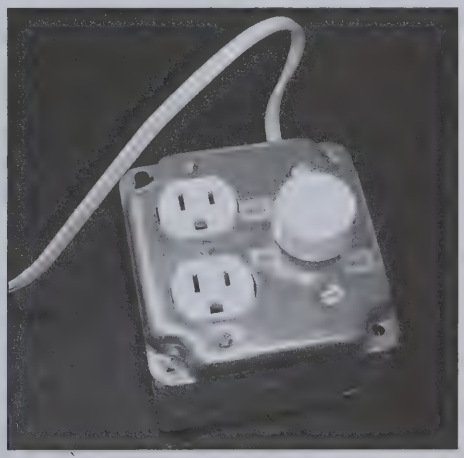


Figure 24—Soldering iron controller built into a standard electrical box.

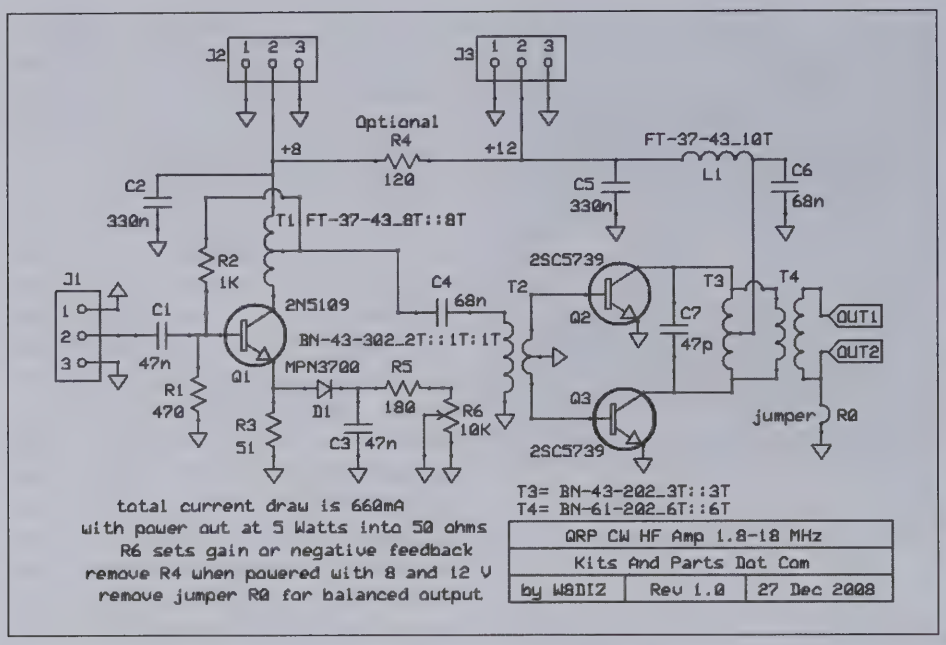


Figure 25—Schematic of the 5-watt CW amplifier. (Note—an output low pass filter is also required.)

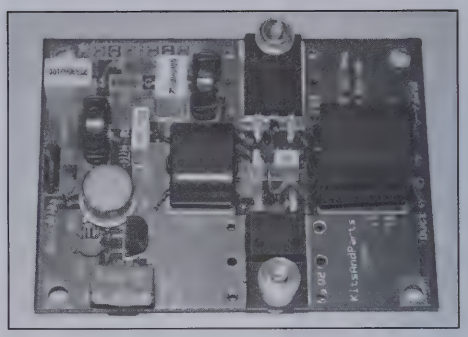


Figure 26—Assembled W8DIZ kit for the amp.

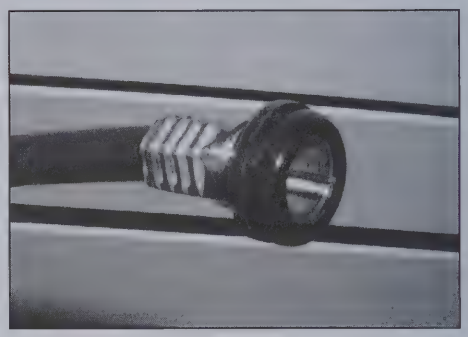


Figure 27—A grommet over a type F connector makes it easier to connect.

Figure 28—Type F connector with grommet in use.

soldering temperatures and it really works.

(*WA8MCQ note*—All of us oldtimers know this but since LEDs rule the world now and neon bulbs are used much less than in years past, this might not be as well known as it once was: bare neon bulbs must be used with a current limiting resistor. If you connect one directly to the AC power line it will explode. Most neon bulb assemblies being sold now should have a built-in resistor, but older ones scrounged up somewhere may not. (For 110 VAC use, a good ballpark figure would be in the vicinity of 100K, although 220K was also used a lot. It also depends on the part number of the bulb.)

—DE W4STX

Five Watt Amp for QRP

Dieter "The Toroid King" Gentzow, W8DIZ (also known as Diz), operates a small home business with things for homebrewers. (The URL is http://www.kitsandparts.com/) He also has a number of small kits listed under keyword RFtoolkits, which he describes as electronic building blocks. Schematics are included so there is enough information to build your own although he also sells kits for most of them, with parts and PCB. One of them is the 5 watt CW RF amplifier. Figure 25 shows the schematic and Figure 26 is a photo of the finished kit he sells if you prefer to go that route.

He mentioned it's availability in an online QRP discussion forum with these comments—

"This amp puts out a solid 5 watts with no heatsinks. The total current draw at 12 volts is 450 mA, the most efficient transistor amp I've ever seen, and stable as a 1 ton truck.

"Signal source was 400 mV P-P from the output of a diode ring mixer through a 7 pole bandpass filter. That is about 300 uW drive power.

"This amp will put out a full 10 Watts but you need to use heatsinks and change the output winding of T4 to 7 turns. You'll also need to double the drive power, but still less than 1 mW. The amp was tested using a 7 pole low pass output filter for 20 meters."

The 2SC5739 is an inexpensive Panasonic part, available from DigiKey (W8DIZ also has them), with an f_T of 180 MHz. Keep in mind that the schematic does not show an output filter (and none is supplied with the kit). You'll have to add your own, designed for whatever band you use it on.

(Disclaimer—I asked him to let me show the amplifier here; no freebies were requested or received.)

Better Grip for F Connectors

Type F connectors are widely used on cable TV systems as well as Internet cable modems, and they are also sometimes used for ham cables. (Used 75 ohm cable can often be obtained for next to nothing from local cable TV companies.) Weymouth Walker, K8EAB, posted this tip to the Northern Georgia (NoGA QRP) forum on Yahoo.com a while back—

I'm sure that by now somebody is manufacturing better TV cable connectors, but my old ones still work well. However, they are difficult to connect and disconnect (and with the severe weather we had, I had to do that for 2 TVs and my cable modem dozens of times in 2008).

I came up with a quick and cheap way to make the task much easier. Slip a rubber

grommet over the connector as seen in Figures 27 and 28. This makes thread alignment and reconnecting a snap.

—DE K8EAB

Spectrum Snapshot with a Quiet Sun

Paul Harden, NA5N, has worked for years at the VLA, Very Large Array, which is operated by the National Radio Astronomy Observatory (NRAO). He is quite knowledgeable about radio astronomy, sunspots, etc. He recently made a post to an online QRP forum about a graphic radio astronomy plot of the 8 to 100 MHz spectrum during a period when the sun was quiet. Full details can be found on qrpedia.com, an online resource started by Jason Milldrum, NT7S, to provide "A place for QRP homebrewers to share their projects with the world." Paul also provided me with the basic plot to share with you. (He said credit for the plot goes to the Long Wavelength Array project, Univ. of New Mexico. It's located at the VLA but not part of it.)

The following is based on his posting, the qrpedia.com article and several e-mails we swapped—

Figure 29 is a plot of the RF spectrum from 8-100 MHz in December 2008 during daylight hours (3 PM MST) and typical of the HF/VHF spectrum during the quiet sun. The bandpass of the receiver is about 10-80 MHz. Signals below 10 MHz (AM broadcast band, shortwave under 8 MHz) and above 80 MHz (FM broadcast band) are reduced at least 30 dB due to being out of band and additional filtering. Resolution bandwidth is about 30 kHz per channel. Believe it or not, atmospheric noise peaks around 30 MHz—not 7 MHz!

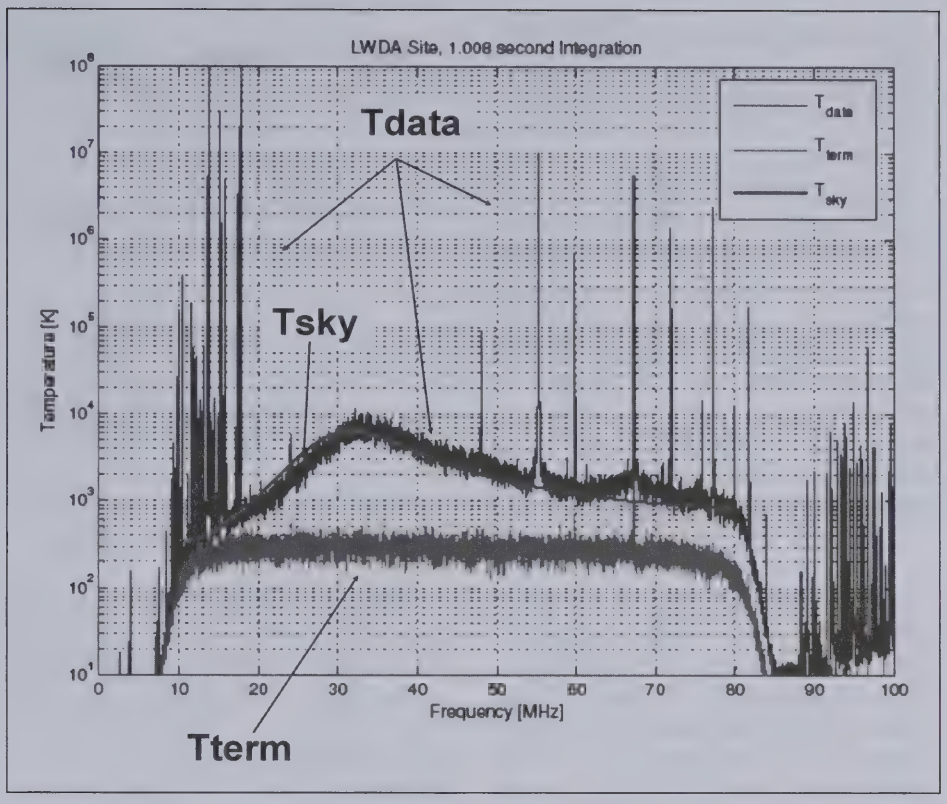


Figure 29—Spectrum plot of 8-100 MHz with a quiet sun. (Plot courtesy of the Long Wavelength Array, University of New Mexico.)

8-18 MHz—This is a good chunk of the "shortwave" bands. It looks pretty much like what it sounds like—dominated by strong international shortwave broadcast stations along with utility stations, ship-to-shore, government and military services, etc. And, of course, the 20M ham band.

14 MHz (20M)—The plot, made about 3 p.m. MST, is a period of time when the 20M ham band is relatively active. In spite of this, the total power in the 20M band is dwarfed by that in the surrounding 13 and 15 MHz international broadcast bands.

18 MHz—Signals stop abruptly at 18 MHz. This is the maximum usable frequency (MUF) for this particular date and time. Astronomers call this the plasma frequency. [Well above that are VHF TV channels 2 through 6 and the FM broadcast band. —*WA8MCQ*]

The spectrum plot was made by the Long Wavelength Array (LWA) prototype low-frequency radio telescope, operated by the University of New Mexico. It is a new low-frequency radio telescope under development for radio astronomy, atmospheric studies, ionospheric physics, and other sciences. The QRPedia file also includes some background information and photos of the LWA. The LWA Systems Engineer graciously allowed me to share these LWA observations with QRPers (since this is a new radio telescope under development and scarcely known to exist, well, except now to QRPers!).

Though a few years away, it is hoped the LWA will provide real time 3-D images of the D, E, and F layers in our ionosphere for real time HF propagation paths and predictions. That could revolutionize how hams and QRPers exploit the real time condition of our ionosphere for HF propagation.

The wideband 8-80 MHz antennas being developed are also interesting, which could also have some intriguing QRP portable applications in the future. I can't wait to load one up and see how it works on 40-10 M!

The spectrum plots probably won't tell you old timers like me anything new, but for those of you new to ham radio, it does show what the HF and VHF spectrum looks like in a graphical form. Besides, there's nothing else to do right now while waiting for the sun to wake up and do something.

Acknowledgement: I would like to thank Dr. Joe Craig for providing me with the copies of the RF spectral sweeps from the LWA. I asked him for copies to specifically share with QRPers and hams, for which he willingly obliged. Many thanks. The NRAO, the VLA, or myself, have nothing to do with the LWA project except for some professional logistic support—namely, loaning them some land for the LWDA prototype array (a fairly quiet RF environment), electricity, internet access, etc. The information contained herein is strictly my own personal opinions and limited first-hand knowledge. For more information on the LWA, visit http://lwa.unm.edu/.

[*WA8MCQ note*—VLA is the entire project and LWDA is the antenna system, Long Wavelength Demonstration Array.]
—DE NA5N

WA8MCQ comments—In the plot, Tterm is the output with the receiver input terminated, representing the internal noise of the receiver itself. Tdata shows what the antenna picks up. Although easily visible in the color plot (available at qrpedia.com), the smooth Tsky line that follows the "grass" of Tdata is hard to see in black and white. I asked Paul if it was an averaged or smoothed version of Tdata and he replied with this—

"Tsky (the red line) is the theoretical sky temperature over the frequency range. It represents the total noise power due to our ionosphere (solar heating) and galactic noise, as if no man-made emissions were present. This is not a measured value (at least with this instrument) but for hams, it basically shows what the noise floor of the receiver SHOULD be at different frequencies without man made signals (and an antenna connected).

"Tdata is the total noise power from the receiver, which in some cases is simply the background noise (Tsky) or a discrete man-made signal. (Astronomers like using temperature vs. hams using power in dBm).

"If the actual noise power of the receiver (Tdata) differs from Tsky by much, then some source of noise power is not being accounted for. In this case, the noise floor of the receiving system (Tdata) falls right on the theoretical noise floor (Tsky) due to our ionosphere. That's a good thing.

"The noise temperature, or noise power/figure of the receiver and antenna, is calculated and subtracted from the total received power. The difference should be the absolute power of the incoming signal, whether noise or a true signal. In radio astronomy, the power striking the antenna is always called the 'sky power' or the 'sky frequency.' In the VLA, we insert a calibrated noise source 20 times a second to accurately measure the total noise power of the electronics to derive an accurate sky power. I'm not sure how LWA does noise calibration. Basic Dicke receiver approach.

"In radio astronomy, we are usually measuring wideband noise power. In ham radio, we are interested in some very narrow band emission (CW/SSB). It is that difference that causes some confusion in interpreting the plot."

[*WA8MCQ note*—if "Dicke receiver doesn't ring a bell, you can do a Google search on that term or "Dicke radiometer" and find several references.]

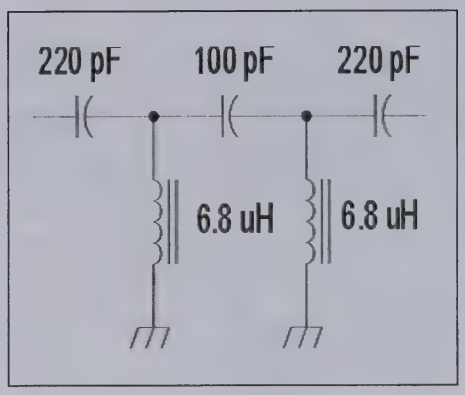


Figure 30—Schematic of the high pass filter.

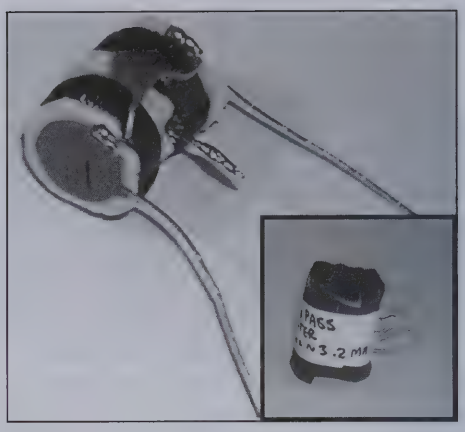


Figure 31—One construction method for the filter.

High Pass Filter for the Pixie Transceiver

There has been a resurgence of interest in minimalist QRP rigs of late, and the Pixie is one of the oldest. It can be susceptible to interference from nearby AM broadcast transmitters; here's a fix for that which was posted on one of the online QRP forums a while back by Kendrick Goss, KB1NCR. This is a compilation from his post and web page, http://kendrickgoss.com/KB1NCR/highpassfilter.html—

I have had a great time with the Pixie and have learned a ton from making and remaking, then breaking this circuit. I have one modification that I add every time. It is a Chebyshev high pass filter using two T50-2 toroids, with 37 turns each of 24 gauge wire and 3 capacitors, shown in Figures 30 and 31.

In the Boston area, there are about one million watts of AM broadcast and all of it comes through loud and clear on the Pixie, making it almost unusable. I resolved to make a high pass filter that would exclude all radio below the 80 meter band; it is designed to exclude anything below 3.18 MHz.

The design inspiration came from a retired QRPp-i filter kit (that has now disappeared from their site altogether) and a lot of time reading the website of Todd Gale, VE7BPO. Specifically, one of his active antenna designs contains a 5-element Chebyshev filter similar to the QRPp-i filter, with a cut off of 3.18 MHz—perfect for my purpose. I modified the design to use parts that I had on hand.

Being very much a beginner at building circuits I do not have the test equipment to characterize the actual response of the filter—but it works as predicted with a cutoff of about 3 MHz.

In Figure 31, I have stuck the parts together with double stick poster mounting squares and then wrapped it up with black tape. I use this little version to clip into an antenna or tuner when experimenting.
—DE KB1NCR

WA8MCQ comments—The VE7BPO web site is http://www.qrp.pops.net/ and is well known to many QRPers. Once known as QRP Homebrewer and now called QRP/SWL Homebuilder, the Amateur and Short Wave Radio Electronics Experimenter's Web site, it is excellent.

Actually, Kendrick's web site and post said this filter worked well for both 80 and 40 meters. I plugged his numbers into some filter analysis software (see note 1) to verify that. It has excellent rejection of the broadcast band and a certain amount of insertion loss at 80 meters (2 dB, which can be improved further with a change to some values), but it increases substantially at 40 meters due to the passband ripple, as shown in Figure 32. The ripple is a characteristic of a Chebyshev filter. (In subsequent figures the scales for the horizontal and vertical axes jump around a lot; they are not all the same.)

If used solely in a receiver, the 7 or 8 dB of loss at 7 MHz could perhaps be tolerated as a tradeoff for the convenience of

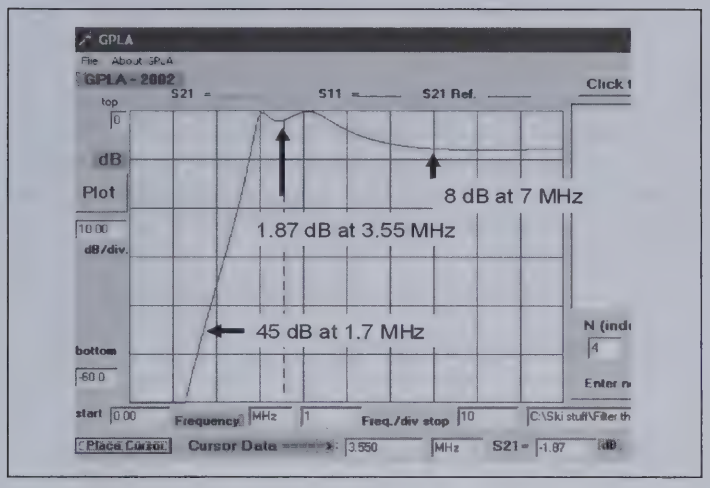


Figure 32—Analysis of the filter with the KB1NCR values. (0 to –60 dB amplitude, 0 to 10 MHz sweep.)

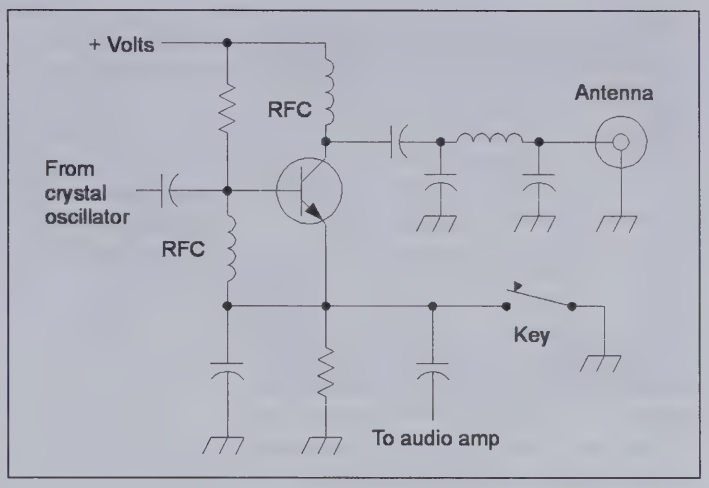


Figure 33—Simplified Pixie schematic. The transistor is both final amplifier and detector.

having a single filter cover both bands. However, the design of the Pixie is such that an external filter is in circuit in both receive and transmit and cannot be applied to the receive side alone without some added switching. (Figure 33 shows a simplified schematic. The transistor serves double duty as a final amplifier and detector.) That amount of loss on transmit would be unacceptable. He later said, "As you guessed, my assertion that it works on both 80 and 40 was based on a dramatic reduction in unwanted broadcast interference."

I played around with different values for the two inductors, keeping the original capacitor values, until I got an acceptable insertion loss at 40M while keeping good rejection of the broadcast band. The results are shown in Figure 34, which gives an insertion loss of 0.1 dB at 7 MHz and 67 dB of rejection at the top of the broadcast band. The revised inductor values are 2.2 µH.

The original values can still be used for an 80M filter, of course, although the insertion loss is a bit much in transmit since there's not a lot of power to begin with. Note that there is a certain amount of pass band ripple with 2 peaks (back in Figure 32), typical of a Chebyshev response. By changing the value of the two inductors either of those peaks can be moved to cover the low end of 80 meters to give more power out. The cutoff frequency will also change, of course, which in turn affects the rejection of broadcast band frequencies.

Figure 35 shows the response with both inductors changed to 9.1 µH, keeping the original capacitor values. The response has shifted lower in frequency, and the second peak is now at the low end of 80M with low insertion loss, and is relatively wide. The cutoff has moved below 3 MHz, and rejection at the top of the broadcast band is now only 36 dB but drops off considerably below that. Depending on what AM broadcast frequencies are in use in your area this could still be quite acceptable.

In Figure 36, the inductors are both reduced to 5.1 µH. This pushes the cutoff frequency above the original 3 MHz and also moves the first peak onto the lower end of 80 meters. This peak is narrower than the second one, but still about 150 kHz wide at the 1/2 dB points. The coils can be tweaked by varying the turns spacing and/or number of turns to fine tune the point of lowest insertion loss.

All of this is based on computer model-

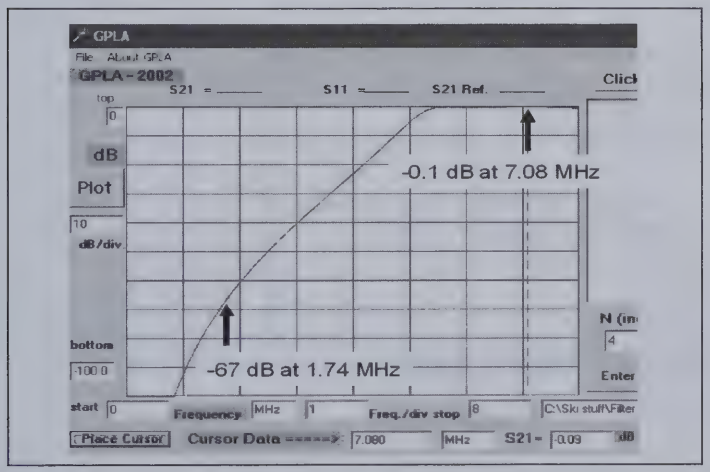


Figure 34—Changing the inductors to 2.2 µH each gives an acceptable 40 M filter. (0 to –100 dB amplitude, 0 to 8 MHz sweep.)

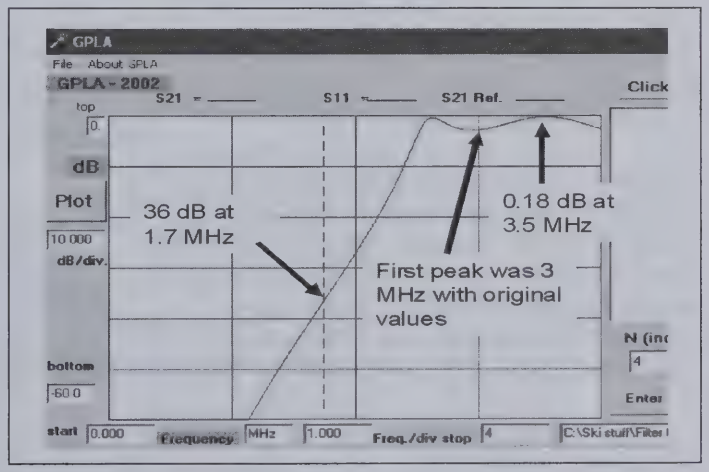


Figure 35—Changing the inductors to 9.1 µH each drops the cutoff frequency and reduces loss on 80 M although the rejection of broadcast is less. (0 to –60 dB amplitude, 0 to 4 MHz sweep.)

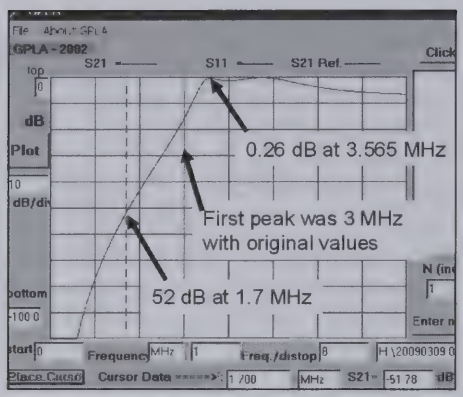


Figure 36—Changing the inductors to 5.1 µH each raises the cutoff frequency and also reduces loss on 80 M. (0 to –100 dB amplitude, 0 to 8 MHz sweep.)

ing and I have not built any actual filters yet, although I hope to do that in the future. I'll measure and tweak and send them to KB1NCR to give them a "trial by fire" in his AM-broadcast-intense RF environment.

Note 1. I originally started analyzing this filter with the design and analysis software from Almost All Digital Electronics, www.aade.com. (A few years after I purchased a copy he made it available as a free download but I don't regret paying for it.) After running through a few variations on this filter I moved over to the software that comes on the CD with *Experimental Methods in Radio Frequency Design*. Unlike the AADE package in which everything could be done in one place, the EMRFD suite requires one program (Ladder Builder) to set up a file for a filter and a second program to analyze it, but I found it easier. The analysis portion is GPLA, General Purpose Ladder Analysis. The figures shown are all screen captures from GPLA.

Note 2. Toroid recipes for the inductors mentioned, calculated with the DOS based RF-Toroid program, a free download from micrometals.com; click on Software, then select RF Design Software (Toroid.zip). These are based on a T50-2 core; the largest diameter wire (lowest gauge number) that will allow these turns to fit on the core is also given.

9.1 µH, 42 turns; #26
6.8 µH, 37 turns; #24
5.1 µH, 31 turns; #24
2.2 µH, 21 turns; #20

—DE WA8MCQ

The Fine Print

If you have something for the *QRP Quarterly* and aren't sure who to send it to, don't worry too much. If not sure, just get it to anyone on the editorial staff, or any other club official for that matter, and we'll take care of it. I get things relayed to me on a regular basis by others, and I pass things to them. The soldering iron controller from W4STX is a perfect example; he submitted it to W4DU, who forwarded it to me. Just get something on paper, on a floppy or CD or in an e-mail and get it to someone and we'll take it from there. Operators are standing by!

■■

Program Listings for WØUFO's QRP Antenna Selector

BASIC for the Master:

```
'PICAXCE  BCD TO DEC Master
Main: pause 200                 'let system settle

      if pin1 =1 then    'check input from pins
            b1 =1               'BCD to decimal into b1
      endif

      if pin2 = 1 then
            b1 =2
      endif

      if pin1 =1 and pin2 =1 then
            b1 =3
      endif

      if pin4 = 1 then
            b1 =4
       endif

       if pin4 =1 and pin1 =1 then
            b1 =5
      endif

      if pin4 =1 and pin2 =1 then
            b1 =6
      endif

      if pin4 =1 and pin2 =1 and pin1 = 1 then
            b1 = 7
      endif

      if pin1 =0 and pin2 =0 and pin4 =0 then

            b1 = 0              'no input to pins
      endif
      pause 100
      serout 0, N2400,(b1)      'send b1 to slave
      goto Main
```

BASIC for the Slave:

```
'picaxe Remote (slave)3 relays for 8 outputs
'pin0 Flashes to indicate active and zero position output.

Main: pause 200
 serin 3, N2400, b1      'get info from master
 pause 100

 if b1 = 1 then
     low 2,4             'make sure unwanted outputs are low
     pause 100           'time for relay drop out
     high 1              'Relay one for output 1
     goto Main
 endif

 if b1 = 2 then
     low 1,4             'unwanted
     pause 100
     high 2              'Relay 2 for output 2
     goto Main
 endif

 if b1 = 3 then
     low 4                       'unwanted
     pause 100
     high 1,2            'Relay 1 & Relay 2 for output 3
     goto Main
 endif

 if b1 =4 then
     low 1,2                     'unwanted
     pause 100
     high 4              'Relay 4 for output 4
     goto Main
 endif

 if b1 =5 then
     low 2                               'unwanted
     pause 100
     high 1,4            'for output 5
     goto Main
 endif

 if b1 =6 then
     low 1                               'unwanted
     pause 100
     high 2,4            'output 6
     goto Main
 endif

 if b1 =7 then
     high 1,2,4          'output 7
     goto Main
     endif


 high 0                  'output 0 for flashing active
 pause 300               'and indicates that the output is 0.
 low 0
 low 1
 low 2
 low 4

 goto main
```

Get on the Air—Operate in QRP ARCI Contests!
Mark Your Calendars:

Summer Homebrew Sprint
July 12, 2009

Silent Key Memorial Sprint
August 15, 2009

VHF Contest
September 12-13, 2009

The A/N X-15 Galactic Transceiver

Darron Sanchez—WA5TCZ wa5tcz01@cox.net

[*This story originally appeared on eHam.net, and is used here with their permission. —Ed.*]

The unexpected visit from the Secret Service at precisely 4 a.m. in the morning on June 9th, 1950, was a shock. But, I am getting ahead of my story.

It all dates back to the 1950s. I was a young Ham, just upgraded from Novice to General. New call, WA5TCZ. I was 26 years old then and lived in Nevada. By the way, my name is Darron.

This whole story starts with my interest in Ham Radio, and without the help of my kind Elmer Al, W5OVV, there would be no story. Al was old beyond his years; always had a smile and a kind word for everyone. You see, Al was the proprietor of Al's Army/Navy Surplus store, the largest in Nevada. Al delighted in traveling around California and Nevada, buying up all the electronic equipment that he could get his hands on at government surplus sales. At that time in the '50s, there was a big demand for electronic gear built to government specifications, and the hams came from far and wide to purchase great gear at rock bottom prices and convert it for the Ham bands. Al would always call me after a government auction when it was time to pick up another shipment and unload all that electronic equipment into the big Surplus store. And, as always the case, he would tell me to take something home for my trouble. I had all kinds of neat surplus equipment—ARC-5 receivers and transmitters, National, Hallicrafters, Collins, and many more too numerous to mention that had been converted to the ham bands.

As I look back now after 65 years and never have told anyone this story, I'm sure that one shipment must have come from AREA 51!!! As every one now knows, some very strange things happen in AREA 51.

On this particular day, June 9, 1950, Al told me to look in the special store room and let him know if I wanted to take those six heavy crates home, play with the gear and report back to him as to what they were. I was always excited when he told me to play with unknown gear. I loaded the boxes in my truck, and boy they were heavy. I told Al "good day" and was off, happy to have something to experiment with tonight. When I got home, I unloaded the six boxes and started to examine them more closely. The first thing I noticed: These were not the run of the mill government boxes. They were precision built to exact standards—water proof, shock proof, and made of a metal I did not know. I had to look very hard to find the locking device. It was so well concealed, and when I pushed the lock the door opened with a swooshing sound that scared the heck out of me.

There inside of the box were six manuals, and I thought, now I'm getting somewhere. I started flipping through the manuals and was at first disappointed. They were so technical and crammed with math and formulas that were over my head, but a diagram of how to set up the six boxes was there. I lost no time setting up each box. Box number six had special directions. It was marked antenna, and stated CAUTION SET UP IN OUTSIDE OPEN AREA AND STAY BACK 100 FEET. The rest of the instructions were straight forward, except for the 2" cable that stated "Do not kink mirrored surfaces." Now I know this was the first fiber optic cable of some sort that led out to the antenna.

I finally got everything hooked up and there was just one last thing—there was a warning stating "Caution 5 volts @1/2 amp only." I applied the correct voltage, and to my surprise somehow the imprint of a hand appeared on what looked like the front of the unit. I placed my hand on this imprint and thought to myself "How do you turn this thing on?" Much to my surprise a screen appeared, one like I had never seen before, and now I know after so many years that I was looking at the first Liquid Crystal Display. Still not totally grasping what had just happened, I thought again, "How do you get this thing tuned to a frequency like 7.015?" and this same question popped on the screen. Now I really knew what was happening. I stopped for a few minutes and read the screen. There, flashing on the screen, was "Beacon on and Transmitting." I looked outside and saw a very bright light and slowly walked outside making sure to stay 100 feet away.

What I saw was a hologram of the brightest lights I had ever seen, all colors and shining into the night sky, spread out over 1,000 feet to the East and West. I'm guessing it was over 1,000 feet straight up into the night sky, the biggest, the most beautiful FAN DIPOLE I had ever seen. I knew this was going to be the best antenna I had ever used. Now I know after all these years I was looking at the first lasers or phasers.

I went back inside, placed my hand on the imprint, and the screen started flashing again and a title came up .The A/N X-15 Galactic Transceiver. TOP SECRET. I was thinking what the heck is a Transceiver? They were not invented in the '50s.

I wondered to myself, "What does the rest of this thing look like?" and all the doors came open with a loud whoosh and scared the heck out of me. All of the subassemblies had been built in different states and shipped to either Nellis AFB or Roswell, NM. This was done to keep anyone from building one of these on their own. As every one knows, this is definitely AREA 51-like procedure.

There inside, as I looked at all the parts, there were long black plastic-looking objects with as many as 40 electrical contacts on each. There were literally 100s of these things. Electronic parts I had never seen before. What I did not know then was that I was looking at the first integrated circuits.

By this time, I was getting pretty shook up and was going to pull the plug when this thing started selecting frequencies on its own. Out of nowhere I started hearing stations, and there was no speaker. It finally hit me: This thing was sending these signals to me, broadcast by telepathy!

I started listening very close to what was coming into my head, in amazement as I heard Mr. Marconi's first Atlantic transmission the letter S sent over and over, from England to Newfoundland. I also heard the call WLMO, the first flight over the North Pole by Richard E. Byrd and Floyd Bennett from 1926. I listened some more and heard KDKA, the very first commercial radio station. Also heard were NBC, ABC, and RCA commercial stations. Let's not forget the hams—8XE the first

ham station in America, and Danny Weil and his famous DXpedition, VP2VB. Also heard was Leon Deloy, 8AB, from Nice, France, working Fred Schnell, 1MO, and John Reinartz, 1XAM, the first Atlantic contact between American hams. These famous Hams were also heard—W4CGP, Chet Atkins; K4LIB, Arthur Godfrey; W5CY, Howard Hughes; WB6RER, Andy Devine; and K7UGA, Barry Goldwater. I heard the very first satellite, Sputnik, sending HI HI, the laughter on CW. I had read somewhere that the scientists had figured out that RF radio waves never dissipated. That they just kept on going through space forever. I guess this proves that theory beyond any doubt.

That's when the realization of what I had here before me finally sank in. This thing was so powerful with that enormous FAN DIPOLE shining in the night sky; it could transmit and receive on any frequency at any time of day or night on any band regardless of band conditions or sun spot cycle. I had to try this rig out. There was a big SSB contest going on, and I only had to think and I was working all kinds of rare DX stations and was breaking some of the biggest DX pile-ups on just the first call. Also worked were many rare CW contacts. I busted some large CW pileups with just one call, and with the same results, the DX station gave me the strongest signal report on the band. I could be king of the hill. I could win every contest over and over again and my name and call WA5TCZ would forever be inscribed in all the log books and ham magazines in the world as being the best ever. Like being DX in reverse, and what ham do you know that hasn't had this dream?

Well, I did not dream long because it was 4 a.m. the morning of June 10, 1950. There was a loud banging on the shack door. I looked outside, and my house was completely surrounded by cars with red lights flashing. A voice shouted out "Open the door! Secret Service agents." This snapped me back to reality in a hurry.

I got up, opened the door, and standing there were about thirty guys dressed in black and one had his Secret Service badge out and shoved in my face. They pushed their way into my shack. I did not notice at first, but there was also an older gentleman in a white lab coat. He walked over to the machine, put his hand on the imprint, and shut every thing down. He looked at me and smiled.

While the agents were busy dismantling the A/N X-15, this gentleman in the lab coat guided me to the corner and stated "I'm glad a ham found the X-15. I'm a ham, too, you see. My call is WØCXX." He never said his name. "Did you have fun playing with my little toy?" I started out by asking, "Am I in trouble?" He answered "no."

I told him it was the most amazing radio I had ever used. He stated, "The world is not ready for this kind of radio, and I don't know if it will ever be ready. You see, it can transmit into far off galaxies, and we don't want anyone upsetting any aliens do we?" I asked, "How did you find me?" He said, "Remember the screen that said beacon on and transmitting? It's the only beacon like it in the world, and we knew it was the X15 the minute you turned it on." He asked, "Is it yours?" I replied, "No, it was for Al that ran the surplus store here." He told me to tell Al to fill out the proper forms that the government uses when they bought back surplus items they let go by mistake. He also told me to keep my mouth shut about this, and if I went public with the story they would deny any and all claims and try to discredit Al and me.

All this took about 15 minutes and they were gone along, with the six boxes. It was 4 a.m. in the morning, and I was so wired up I just had to phone Al. Al answered a sleepy hello, and I rattled all to him. He said, "I will call you today some time." But, Al did not call me for over a month. I thought he was mad at me for losing such a great piece of surplus gear. Al finally came over with a bunch of papers. He was very excited and told me to sign all these papers. When I finished signing all the papers he handed me the key to Al's Army/Navy Surplus Store. He said "Now you are the owner. The government gave me enough money for that x-15 whatever you called it. I can now go island hopping, and it's my time now to be the DX station." Al moved on and, true to his word, from time to time I would hear him and see his DXpedition written up in the magazines.

Well, it's been over 30 years for me now, and I can finally tell this story without getting into trouble with the Government. I found out the tall guy in the white lab coat, whose call was WØCXX, was none other than the brilliant mind and founder of Collins Radio, Mr. Art Collins.

By now, the sale of surplus electronics was beginning to fall off. It made a good living for me. Now with all the fancy transceivers, hardly anyone builds gear now except the QRP gang, and that's taking over like wild fire. I had made up my mind to give the remaining surplus inventory away and offer the 60 acres of dusty, sandy Nevada desert up for sale on the local TV station. The very next day I got a call from the Nevada Gaming commission. They offered me an eight figure number, starting with the number nine, for this worthless desert sand.

Now, I'm the one that's running DXpeditions from exotic islands.

■■

QRP "Over the Top"

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N7UN and NØTU take us on another QRP adventure to America's high country during the annual Colorado 14er operating event. And, N6IZ on top of Mt. Whitney, another 14,000 foot mountain, tells what it was like to be at the other end of a rare QSO.

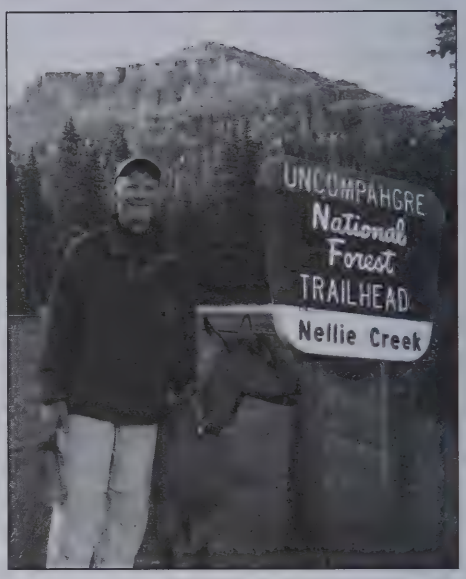
Part 1: The Colorado Story (N7UN)

Beginning in the early '90s, the Colorado 14er has been a unique operating event each August. Attracting altitude-capable, outdoor-oriented hams with the desire to operate portable from the top of one of 54 Colorado mountains over 14,000 ft., it is primarily a VHF event due to the practicality of lightweight 2m and 70cm FM handi-talkies. Although several of the summits are vehicle accessible, notably Pikes Peak, most hams climb to the top, operate for several hours or until the frequent afternoon thunderstorms force a run for safety to lower, less exposed elevations. Even nearby states get in on the fun, notably several western Kansas clubs who activate the "rarified air" of Mt. Sunflower (4,039'), the highest peak in Kansas also known as the "Peak of Death."

After reading the August 2005 *QST* article by Chris Ormsby, KØCAO and Bob Witte, KØNR, I thought what fun a HF QRP operation from a 14er would be, and there was the "carrot" that an out-of-state 14er to 14er HF contact had yet to be made. And after the N7UN and NØTU fun-packed hike through the Canyonlands National Park in April 2008, Steve and I made plans to participate in this unique Colorado operating event. It was after we heard that Brian Boschma, N6IZ, was planning to HF QRP-activate Mt. Whitney (14,497 ft.) the same weekend as the Colorado 14er event that our mutual plans solidified. We would take a crack at making the first out-of-state summit HF QRP contact between a Colorado 14er and Mt. Whitney in California!

Steve, NØTU, has a considerable following on the Web because of the use of his pack goats, Rooster and Peanut, to carry backcountry camping gear for those multiday hiking trips through Colorado's backcountry. The obvious goal would be to establish a base camp, use the goats to carry the heavier HF gear, leave early for the summit climb to maximize HF and VHF operating time on top, and descend before the afternoon's expected thunderstorms. We also established an every 15 minute calling schedule with Brian, N6IZ, on both 40m and 20m CW for our attempt at the record.

Uncompaghre Mountain at 14,309 feet and located just northeast of Telluride was a perfect choice. We had requested NØB (pun intended) as our special event 1x1 call several months in advance. The summit climb, at just under eight miles roundtrip from the basecamp area, was remote enough to not have hundreds of hikers distracting us from our mission of making contact with as many HF and VHF folks we could. Even then, for the 30 or so hikers we encountered at the summit during our 3 hour stay, we put on our "ham radio ambassador hats" to explain what we were doing and why. It also amazes me how curious folks are about ham radio… or was it Steve's pack goats?



Steve NØTU poses with one of his famous pack goats at the trailhead that leads to Uncompahgre Peak.

How to Prepare for a Summit Climb

Preparation and physical conditioning are the first and most important considerations before attempting your climb of anything whether it be your local hilltop, firetower, or scenic overlook. If you are planning anything over 5,000 ft. elevation, acclimation becomes another important criterion, especially if you are traveling from sea level. It takes at least several days for your body to adapt (at a minimum!) so certainly plan your trip accordingly before undertaking your summit climb. Staying hydrated becomes more critical at altitude since it is very dry… drink often to minimize dehydration and altitude sickness.

Obviously, forecast weather conditions can make or break your day! Summer rain in 40ºF. temperatures and any kind of wind can produce life threatening windchills. During our Uncompaghre climb, at one point, we were in the clouds, temperatures were in the low 40s and we had a steady wind of 25 mph for windchills as low as 25ºF. You must have clothing, hats, gloves, and emergency thermo blankets in preparation. Fortunately for us, the cloud blew through and the sun warmed us with temperatures in the 50s. Tall mountains in comparison to surrounding terrain create their own weather and dangerous weather conditions can occur in minutes.

You also want to minimize how much you are carrying in your summit pack as every pound at 10,000 feet requires much more physical effort than at lower elevations. So, seriously examine every thing your packing and don't carry anymore than what you need and your emergency ten essentials. Most importantly, if you have no experience at mountain climbing, team up with folks who are experienced in these high-altitude environments. Altitude sickness is a very real medical malady… almost everyone experiences it to some degree. Experienced climbers learn to recognize its symptoms and take immediate remedial actions.

Our Adventure Begins

We left camp around 4:00 am, the goats packed up with water, my Elecraft K2, and Steve's Yaesu FT-817 for VHF and HF. It

With the ruuged peak in the background, the upward trek begins.

was a moonless night and the Milky Way painted a brilliant swath across the black sky. We hiked by Petzl lamp and the tinkling bells of the goats. After a wrong turn in the dark and losing 90 minutes of climb time, sunrise came early and the alpenglow of Uncompaghre pulled us up the mountain top trail. What exquisite vistas as we climbed higher up the mountain which was now socked in as Uncompaghre was making its own weather. We climbed up the only difficult section, a Class 2+ rock scramble, and were very nearly on top as 20 to 30 mph winds and temps in the low 40s greeted us. Fortunately we located a couple of wind-sheltered rock walls to set up our antennas. Steve was quickly on VHF, making rapid paced contacts with other VHF mountain toppers. I got my multiband dipole installed on my Jackite fiberglass pole in spite of the gusty wind and soon was on 40m CW calling Brian on our pre-arranged frequency and schedule. No luck, so I changed over to 20m CW and was calling CQ on 14060. After several contacts and difficulty explaining our QTH (How do you sound believable: "QTH CO, CO summit of 14er mtn") when several stations were calling, I hear N..6..I..Z weakly under the much stronger stations! I yelped, "That's Brian" with a fist pump into the rarified air. I called N6IZ and with a quick exchange to solidify the contact and a few "FB's" congrats to each other and we were off to other callers. Steve took over the CW key on the K2 and then made a number of additional contacts.

We switched over to 20m SSB and also made a number of contacts throughout the US. But we were watching the weather closely as some dark based clouds were forming upwind from the mountain top. Around noon, we decided to start our decent just as a threatening dark cloud was forming. The descent was easy since gravity was working with you! We made it back to base camp, wearing the excited glow of accomplishment and a job-well-done. We exceeded our goals of not only climbing a 14er, participating in the Colorado 14er event as primarily a QRP HF station, but to also make contact with Brian and become the first for an out-of-state, summit 14er-to-14er contact!

The pack goats take a break. Do you think they enjoy the scenery or the greenery?

So What's Next?

This is a fun event! Many of the Colorado 14ers are relatively accessible and don't require a great deal of technical skill to summit. Obviously some acclimatization is necessary, but most folks in good physical condition can participate in this truly unique operating event. And even several of the drive-up mountain teams were looking for HF operators to help out. So plan your next August portable event on the top of one of Colorado 14ers for a truly great and certainly memorable experience. Maybe we will see you in 2009 as we plan our trip for next year! Now if we can talk Brian, N6IZ, into a climb of Mt. Shasta, CA or a ham in Washington to activate Mt. Rainier, we could make this into a truly breathtaking event (pun intended)!

Part 2: The Mount Whitney Field Report (N6IZ)

It is 4 am and three hours have been spent climbing to 11,000 ft from the 8,000 ft trail head start. Next to a cascade of white water that can only be heard, a short rest is in order. My three days of supplies are hoisted onto a rock as a cool breeze chills my bones. Nothing is visible, the granite walls are black shapes outlined by the disappearance of a stunning night sky. Wet from the hours of ascent, the skin is quickly chilled and nearly uncontrolled shivering takes over. A fleece top slides

The rugged 14,505-foot (4421-meter) summit of Mt. Whiney was N6IZ's destination on this QRP expedition.

over and my climb restarts. One more hour of switch backs, the White Mountains to the east begin to show contour as the sun casts a red tinge that also reflects a dark orange glow onto the vertical pinnacles that form the cathedral of rock whose north end is home of Mt Whitney.

The Trail camp has been reached and the cold has only deepened. To recover body heat, I decide to dive into my sleeping bag. Quickly a camp site is selected, the bag separated from the full pack and this operator slides inside to warm up.

After a short nap a group of day packers awakes this trekker as they head toward the summit in the now sunrise ignited cliffs. Most have turned off the head lamps that were so visible in the canyon below in the earlier hours. My sleeping bag is abandoned, the day pack containing antenna and KX1 are separated from the other gear, and the 2nd phase of the assault on Mt. Whitney begins. At this famous point in the trek I'm faced with about a hundred switch backs that turn a near vertical moraine of shattered slabs into a reasonably sloped trail. I wonder what brought John Muir this way, or how he climbed such terrain.

The temperature is now 25°F in this first light and the dome tents of campers are coated with a thin frost haze. I forge ahead into the climb to try and summit in time to open the NØB 14er operation with Steve and Guy who are climbing Uncompaghre in Colorado. At this altitude, the trip is felt deeply in the lungs and to overcome the thinning atmosphere I apply pressure breathing to help. In just over an hour, the saddle at Trail Crest is reached. The western Sierras now appear and the deep shadows of the morning light cast stark outlines of the peaks across the valley floors below. To the north, the John Muir Trail slopes down to Guitar Lake and leads eventually to Yosemite Valley. The eastern ridge forms the support for the ribbon that meanders up another 1,000 feet to Whitney's summit. This portion of the climb is in deep shadow and the cloudless morning sky, so clear after weeks of smoke that had filled the Sierras, paints a deep blue back drop to the treeless, ice polished, igneous domes and spires that poke 4000 feet above tree line. What a stunning play ground upon which a HF operator can cast a signal. The last 1,000 feet of the path, while requiring modulation of pace to keep the dizziness at bay, is uneventful.

The operating locations at the summit are somewhat limited. There are visitors arriving in groups of 2 to 5 with clusters of hikers floating around the summit markers. In order to operate, a 32 ft vertical 10 feet of altitude above the operating position is needed. A pile of rock in which to place the 20 ft fishing pole will serve as a mount. A bit off to the north and a few tens of feet below the peak, the KX1 is placed into service. Three radials are laid on the granite boulders and antenna wire slopes off to the north. It is not long before I hear signals. Conditions are long as Russia and Japan are loud and clear. JA1NUT, always a mainstay of 40m morning CW is there with his killer signal. A few calls are made but he does not hear this small QRP station. A few midwest stations are worked but Colorado, the target QTH of all this effort, is not to be heard in this first hour. KØUIF is my first contact in CO! He asks about NØB as neither of us have heard the Colorado 14er event station. Over the next couple hours, stations from CA, MO, KS, and AZ are worked. Some are aware of the Colorado 14er event, some not. 20 meters is now tried and sure enough I bump into NØB calling CQ, but initially heavy QSB takes away the path. A few minutes later and we are in contact! Guy was at the key and we exchanged information. A record has been set! The weather on Mt Uncompaghre sounds more pressing than the calm conditions experienced here on Whitney. Somewhat later Steve is heard on the 20m SSB HFpack frequency and we do a quick SSB to CW QSO to close out the operation. NØB is packing it in, as am I.

The descent to trail camp, or base camp, is uneventful. Many hikers are passed as they ascend to the summit. A team of Aussies are encountered at the junction of the John Muir Trail and the Whitney peak trail. They have just spent 16 days trekking from Yosemite to Whitney in the Muir wilderness. They all have great memories of the vistas, lakes, and wildlife encountered. All have nothing but positive comments about the care invested in the national forests to preserve the natural setting.

After an evening spent at the 12,000 ft trail camp with friends who hiked up in daylight, all the gear is mounted on the pack frame and Whitney Portal is the final destination. The trail down, even though it had been traveled once already, was eye opening as it now is in daylight. It was enjoyable to watch the plant life return to the harsh granite finish of these hills as the tree line was reached. Now streams draining the basin were lined with a variety of pines, ferns, and mosses. With one more night ahead, this last hike was terminated in a camp very near the access road. Night fell once again on the cloudless sky and the

usual star fields emerged. Sleep came quickly, but was punctuated abruptly a bit after midnight when a stunning scraping sound filled the tent. A glance through the tent door brought a rush of adrenalin as a bear was spied eight feet away browsing through the pack containing radio gear. Politely a request was made of this predator to move on, but to no avail. The KX1 was beginning to look like it may become a snack. A head lamp was flashed at the intruder and he opted to head off in silence. It was amazing that a 300 lb. animal could saunter off in the dark and not make a sound.

Overall, I had a great time in the Sierras combining mountain topping, vistas spanning several western ranges, radio operations with the NØB Team, and the time with old and new hiking companions made the investment in time and effort well worth it.

A Bit About Us

Guy Hamblen, N7UN, has been a ham since 1963 where the deep hum of big power supplies and the dazzling meter lights of his first Elmer in Idaho captured his imagination as a teenager. Hiking, mountain climbing and the outdoors has always been a part of his life. Guy was first licensed as K7YYK, then AA7QZ, then finally N7UN. After relocating to New Jersey with his job at the UPS Information Technology center, he began hiking in the Catskills and Adirondacks of the Northeast, always taking his trusty Elecraft K1 transceiver to have some QRP fun in the field. It's always fun when you get to answer the inevitable question: "You're doing what?" That in itself is the reward for QRP in the field.

Steve Galchutt, NØTU, started his adventure into ham radio in the early '50s with a one transistor crystal set he got for his 9th birthday. Steve roamed the neighborhood clipping on to fences, down spouts and anything metal to see what he could pull in on that tiny earphone. He was enamored with radio waves. QRP has been his main focus over the years, along with building his own gear and operating outdoors. He has built numerous QRP rigs from scratch and kits including several Elecrafts (K2, K1 and KX1) and KD1JV's little ATS series of SMD designs for backpack/trail use. He says, "The magic that happens when, out on the trail, miles from nowhere, you are able to make contact using just a simple wire in a tree and a tiny CW rig you've built yourself is the excitement for me! It's that same thrill you got from having your very 'First QSO' all over again." Several years ago he got interested in pack goats and now Rooster and Peanut share his load when they go backpacking or for a QRP/goat hike. Steve is an accomplished videographer with a significant number of his adventures published on YouTube, http://www.youtube.com/goathiker. To really experience our adventure, following the links to nearly 25 minutes of action video of our preparation, base camp, the climb, and video from the top of Mt. Uncompahgre.

Brian Boschma, N6IZ, is an active outdoorsman. Mountain biking, surfing, competitive sailing, and mountain climbing are his major sports. He combines ham radio with these activities, particularily operating with his KX1 and portable antennas from mountain tops or other remote locations. In addition, Brian travels to Fiji frequently to surf and operate beach-portable as 3D2IZ with an Icom 706. See http://www.n6iz.com for more information. ●●

The Crashcup 1V40 1W Transmitter

Chris Trask—N7ZWY trask@earthlink.net

This project was the result of a desire to design a 1W HF transmitter using nothing more than the 2N2222 transistor and the 1N4148 diode, the most common semiconductors around. Numerous other designs already exist, and the popularity of these devices has prompted design contests which have yielded many good and innovative designs as well as some really bad ones. A goal in this design was to come up with a robust design that was both cost-effective and bullet-proof, keeping the number of devices to the essential minimum but at the same time retaining the qualities of a good design, by which is meant that performance was not to be compromised and design margins such as power dissipation were to be kept reasonably high.

The transmitter consists of three blocks of circuitry, being a variable frequency oscillator (VFO), a variable-gain driver amplifier (VGA), and a power amplifier (PA).

The Variable Frequency Oscillator

In the schematic of Figure 1, transistor Q1 is the variable frequency oscillator while transistors Q2 and Q3 comprise a cascode follower amplifier which provides about 60 dB of isolation from the driver amplifier.

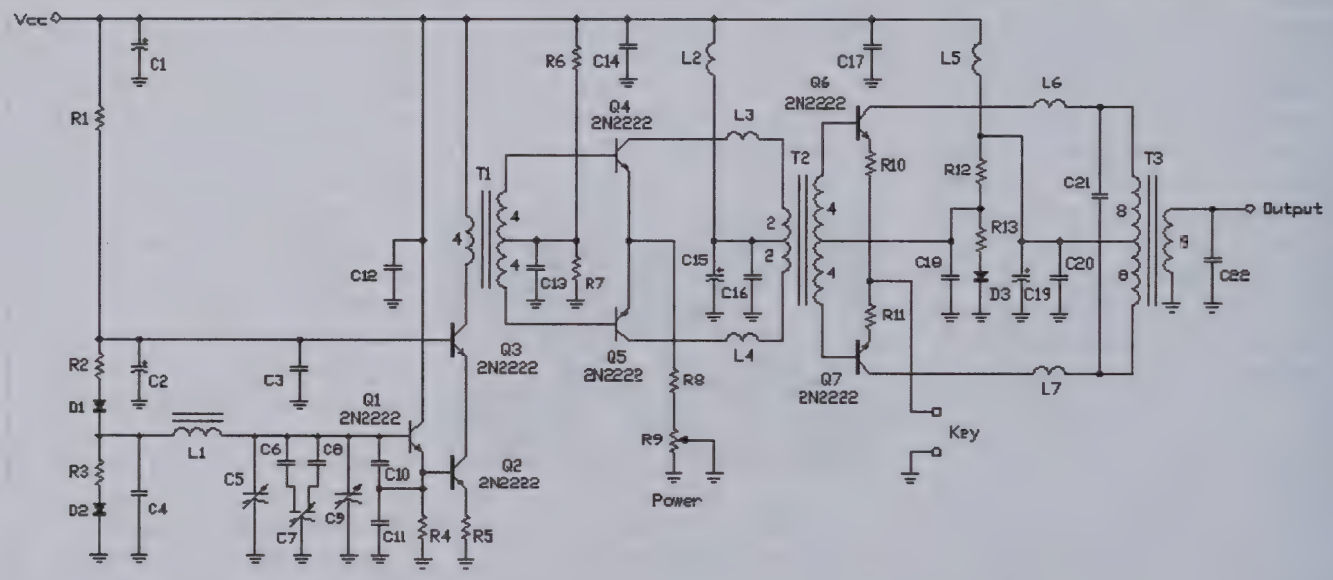
Diode D2 stabilizes the bias point of Q1 over temperature while diode D1 keeps the V_{CE} of Q1 constant over temperature, both of which are necessary in order to minimize the frequency drift over temperature. Capacitors C6 (negative temperature coefficient) and C8 (positive temperature coefficient) and differential variable capacitor C7 provide additional compensation for temperature drift, but these three components can be left out if desired. The adjustment of C7 will be discussed later.

Variable capacitor C5 is the tuning control, while trimmer C9 is used to centre the tuning range.

Inductor L1 is approximately 3.3 uH for 40m operation, and initially consists of 35 turns of #28 AWG enameled wire on a Micrometals T37-10 toroid core. Some variation in the number of turns is to be expected due to the variation in the initial permeability of the powdered iron material, as well as the need to adjust the value due to variations in construction practices, and that aspect of the design will be discussed later.

The Variable Gain Driver Amplifier

Again referring to the schematic of Fig. 1, transistors Q4 and Q5 are the variable gain driver amplifier. In the beginnings of this design, the output power of the transmitter was controlled by varying resistor R5 in the VFO, but this method caused the frequency to vary as the power level was changed. The frequency also varied as the power amplifier was keyed, so it was decided in the best interest of the design goals to add the additional two transistors so as to not degrade the frequency stability.



C1, C2, C15, C19 — 22 uF, 25WVDC
C3, C4, C12, C13, C14, C16, C17, C18, & C20 — 0.1 uF
C5 — 140 pF variable
C6 — 47 pF mica (optional)
C7 — 50 pF differential variable (optional)
C8 — 47 pF N750 (optional)
C9 — 50 pF trimmer (see text)
C10 — 1000 pF mica
C11 — 220 pF mica
C21 — 120 pF mica
C22 — 470 pF mica

D1, D2, D3 — 1N4148

L1 - 3.0 uH (see text) R9 — 5K potentiometer
L2, L3, L4, L5, L6, L7 — ferrite bead

Q1-Q7 — 2N2222

R1 — 1.2K
R2, R3, R5 — 470 ohms
R4, R12 — 2.2K
R6, R7 — 3.3K
R8 — 270 ohms
R10, R11, R13 — 4.7 ohms

T1 — 1:2CT transformer (see text)
T2 — 2CT:4CT transformer (see text)
T3 — 4:4:5 transformer (see text)

Figure 1—Crashcup 1V40 1W 2N2222 transmitter schematic and Parts List.

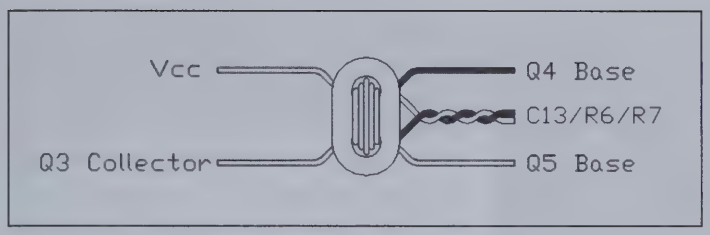


Figure 2—Construction details for transformer T1.

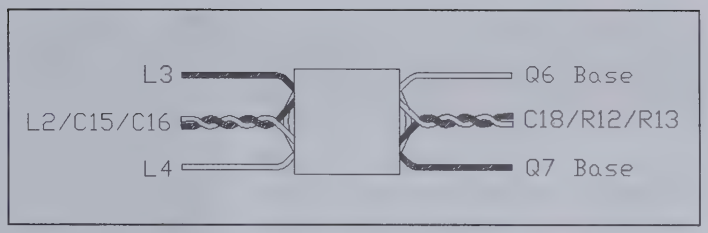


Figure 3—Construction details for transformer T2.

Transformer T1 is a 1:2CT balun. A MiniCircuits TT4-1A may be used here, although a far less expensive and better performing transformer can be made by winding four turns of #32 trifilar wire through the holes of a Fair-Rite 2861002402 binocular core, the necessary details of which are shown in Figure 2.

The transmitter output power level is adjusted by way of potentiometer R9, while resistor R8 sets the upper limit. With the values shown, the output power level can be continuously adjusted from about 50 mW to the full design 1W.

Transformer T2 is a 2CT:4CT bal-bal, and a MiniCircuits TT4-1A may also be used here as well, although a far less expensive and better performing transformer can be made by winding two turns of #32 bifilar wire through the holes of a Fair-Rite 2861002402 binocular core for the primary, followed by four turns for the secondary, the necessary details of which are shown in Figure 3.

What's All This Push-Pull Class B Stuff, Anyhow?

The power amplifier for the transmitter is operated in push-pull class B, which has many advantages, the first of which is the substantial suppression of even-ordered harmonics. Since these harmonics will have the same phase for the two sides, they will be cancelled out by way of the output balun transformer T3, and the degree of cancellation will depend on the balance of the two amplifier halves and the construction of T3.

An additional advantage is the output, or collector power efficiency. In a class B amplifier, the device conducts for just one-half, or rather 180° of the signal cycle. A class C amplifier conducts for less than 180°. An additional class specific for linear amplifiers, class AB, conducts for slightly more than 180° and is used to overcome the gain compression that takes place in tubes and transistors as they approach cutoff. Classes AB1 and AB2 are used for describing tube amplifiers and depend on whether or not the grid is drawing current (1).

Typically, a class B amplifier is biased so that the quiescent current is 5% or less of the peak current. The result is that little, if any quiescent bias current is required, so little DC power is used when no transmission is taking place. In addition, the amount of power that is dissipated by the amplifier devices is much less than would be dissipated in class A, which is generally more than the peak power delivered to the load and often 120% or more so as to overcome the saturation margin of the device and maintain the linearity. In the schematic of Fig. 1, diode D3 serves to maintain the quiescent bias current over temperature, while resistors R10 and R11 provide a slight improvement in linearity and together with R13 provide additional stabilization of the bias current.

Looking first at Figure 4, the voltage and current at the collector of Q6 and Q7 varies as they conduct the signals through its respective 180°. Looking now at Figure 5, the power dissipated by the collector peaks both early and late in the cycle, then decreases to less than half that amount at the 90° point, while the power delivered to the load is far greater. For this PA, the peak power dissipated by the devices is slightly more than 0.4W, about 35% less than the maximum allowed for the 2N2222 in the plastic TO-92 package. And the dissipated power at the 90° point is less than 0.15W. Since each device only conducts for half of the signal cycle, the total average power dissipated by the collector is less than 0.2W.

Those who are familiar with the theory

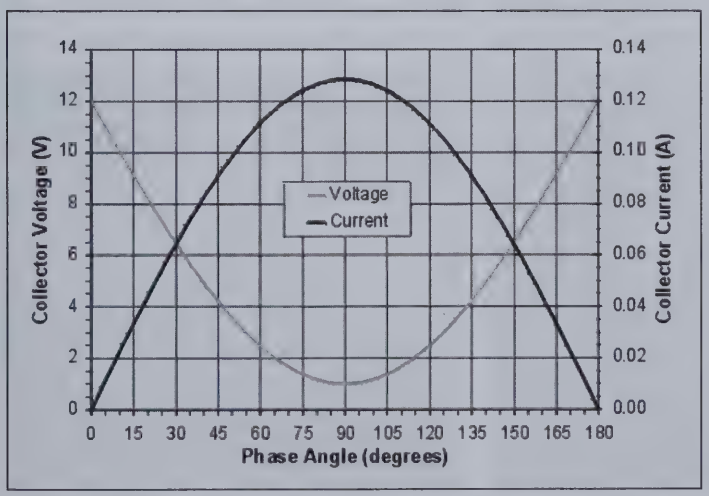


Figure 4—Collector voltage and current for 1W class B power amplifier.

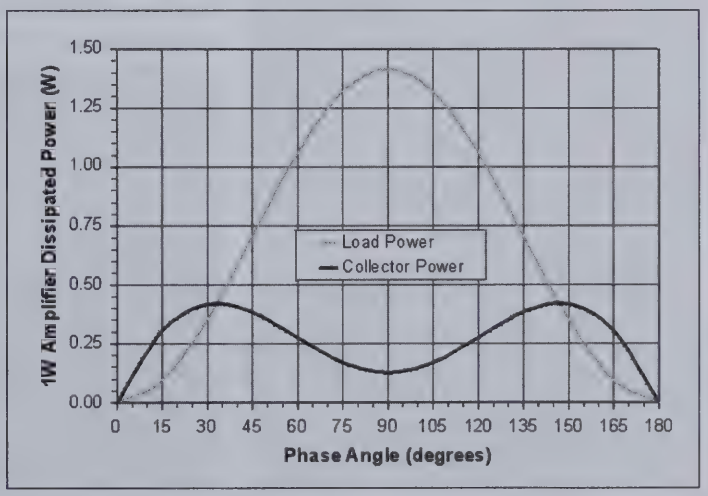


Figure 5—Collector and load dissipated power for 1W class B power amplifier.

of switching amplifiers (classes D, E, F, and S) will recognize this as being the fundamental reason why switching transistors used in such amplifiers run surprisingly cool while delivering large amounts of power to the load. In designing power amplifiers that achieve this degree of efficiency, it is necessary to carefully tailor the collector load impedance with the supply voltage and the transistor collector-emitter saturation voltage ($V_{CE(sat)}$). In the case of this design, the supply voltage is 12V and $V_{CE(sat)}$ is estimated to be 1V. The desired average output power is 1W, which makes the peak power 1.414W, therefore the collector load impedances should be about 42.8 ohms (85.6 ohms total), which makes the turns ratio for T3 to be 13CT:10, but is rounded up to a more convenient 16CT:10.

Harmonics and Filtering

Any amplifier that conducts for less than the full 360° of the signal cycle will generate an increasing level of even-ordered harmonics as the amount of cycle conduction is decreased and single-sided class C and B amplifiers make wonderful comb generators. Many inexpensive CW transmitter designs use such an approach and make up for the excessive harmonics by applying a fairly high degree of filtering at the output. In this design, the even-ordered harmonics are substantially reduced by virtue of the push-pull arrangement, however the odd-ordered harmonics are still present and some degree of filtering is required, though not as intensive as would be needed for a single-sided amplifier.

Capacitors C21 and C22, together with the inductances of transformer T3, comprise a 3-pole lowpass filter (2). The ratio of the values for C21 and C22 is equal to the square of the turns ratio of transformer T3. The inductances of T3 determine the maximum frequency for the lowpass filter function (2), and therefore T3 needs to be constructed with this aspect in mind.

For the 40m band, transformer T3 consists of two windings of eight turns and one winding of ten turns of #26 AWG enameled wire on a Micrometals T50-10 toroid, which was chosen for its permeability so as to have about 24 turns total and at the same time have the proper inductance for a low-pass filter section for 40m. The first two windings are constructed by winding them in parallel so that they begin and end on one side of the core. The third winding is then constructed starting and ending on the opposite side, with the two extra turns placed between the start and finish ends of the first two windings. The photograph of Figure 6 is provided to clarify this construction practice. In the photo, the green and red colored wires are the first two windings of eight turns, and the natural coloured wire is the third winding of ten turns. [*Even in the shades of gray here, you can see three carefully spaced windings —Ed.*]

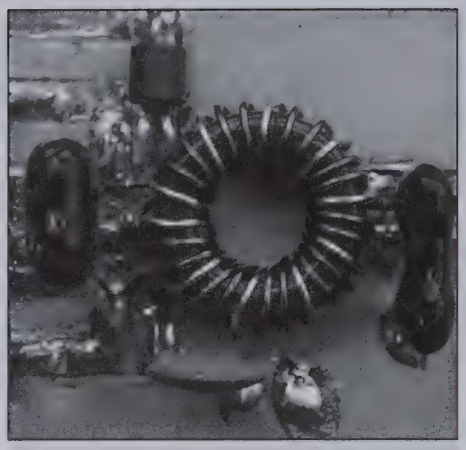


Figure 6—Construction details for transformer T3 and ferrite beads.

Construction and Adjustment

The prototype for this transmitter was constructed on a 2" x 4" piece of 1/16" FR-4 PC board material using leaded components and Manhattan-style traces cut out with a Dremel tool. There is plenty of room left on the board to later accommodate a small audio amplifier for including AM capability.

Inductors L2 through L7 consist of a single ferrite bead on a short piece of bare wire, such as a component lead, one of which can be seen in Figure 6. Surface-mount ferrite beads may also be used.

After construction, increase the supply voltage slowly so as to check for any shorts due to solder splashes. Rotate capacitors C5, C7 (if used) and C9 to their mid-positions. With a frequency counter and a high-impedance probe, check the frequency at the emitter of Q2 and adjust the turns of inductor L1 as needed to get the frequency close to the centre of the desired band. Once that is done, adjust trimmer C9 to fine-tune the centre frequency.

If C6, C7, and C8 are used, monitor the frequency as the transmitter warms up and adjust C7 to reduce the amount of frequency drift as required. This will take a good deal of time and patience, but the end result is worthwhile.

Modifications for Other Bands

The prototype for this transmitter was built for the 40m band as it was convenient. It may, however, be modified to operate on any of the HF bands, including 10m, as well as VLF/LF frequencies by changing the tuning components in the VFO and the components C21, C22, and T3 in the output transformer/filter. The two capacitors can be scaled for the desired operating frequency band, while the transformer will require that a different core material be chosen and the number of turns adjusted so as to have the needed inductance.

For low HF frequencies and especially VLF/LF frequencies, a toroid made of ferrite material rather than powdered iron will be required for T3. Also for the lower VLF/LF frequencies, the material used for transformers T1 and T2 will need a higher permeability, such as Fair-Rite mixes 43 (below 10 MHz) or 77 (below 1 MHz).

Synopsis

This was a fun project as it had some design challenges in squeezing more performance from the immortal 2N2222 and 1N4148. It also provided an opportunity to demonstrate the distinct advantages of push-pull class B operation as well as designing wideband transformers so that they can additionally be used as lowpass filter section inductors.

And, in case you're wondering about the title of this article, Clyde Crashcup was a madcap inventor who was seen in Saturday morning cartoons about 25-30 years ago.

Enjoy.

References

1. Krauss, H.L., C.W. Bostian, and F.H. Raab, *Solid State Radio Engineering*, John Wiley & Sons, 1980.

2. Trask, C., "Wideband Transformers: An Intuitive Approach to Models, Characterization and Design," *Applied Microwave & Wireless*, Vol. 13, No. 11, November 2001, pp. 30-41.

VHF QRP: The EE-3 VHF Antenna

Bob Witte—KØNR bob@k0nr.com

I am always on the lookout for antennas for operating VHF portable. In this issue, we'll take a look at the EE-3 VHF antenna from Evans Engineering.

Basically, the EE-3 is a classic 1/4-wave vertical antenna (a 1/4-wave vertical radiator and 4 radials, see Figure 1). Many of us have constructed such an antenna using an SO-239 connector and stiff wire or metal rods for the elements. The EE-3 is a clever design that uses telescopic elements (similar to those used on portable AM/FM radios) as the vertical and radials. The telescopic elements can be adjusted to tune the antenna to the 146 MHz, 222 MHz and 440 MHz amateur bands. Actually, you could tune it to any frequency within this range.

The antenna arrives in 5 pieces, the main mounting bracket with telescopic vertical element and the 4 telescoping radials (Figure 2). The telescopic elements are threaded on the end to accept a small machine screw (provided). Assembly is simple: just attach the four radials to the main bracket and hand tighten the screws. Figure 3 shows a close-up view of the radial attachment.

The assembly instructions say to use care when handling the elements as they can be bent or broken. This antenna is clearly intended for lightweight portable use and not a permanent outdoor installation.

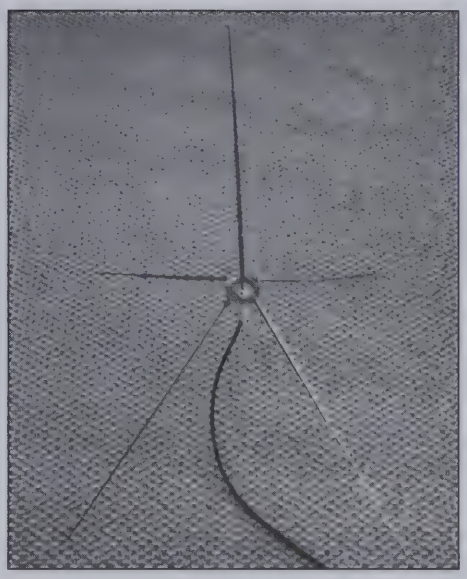


Figure 1—The EE-3 antenna with elements fully extended for operating on the 2 Meter band, with RG-8X coax attached.

Antenna Performance

This antenna is vertically polarized, so it is most useful for the FM portion of the band where most of the emergency and public service communications takes place. The antenna performs, well, like a quarter-wave antenna. That is, it beats a rubber duck antenna by a mile, so it is an excellent way to upgrade your HT transmitting capability. On the other hand, it is an omnidirectional antenna with no gain relative to a dipole.

I checked the SWR on the 2 Meter band with all elements fully extended. The resonance of the antenna and best SWR seemed to be around 150 MHz. However, the antenna is fairly broad in its response and the SWR at 146.52 MHz measured 1.6.

Mounting Scheme

The manufacturer's web site gives a number of ideas on how to mount the antenna. The one I used is a 3/4-inch PVC pipe, routing the coax through the pipe and letting the main bracket rest on end of the pipe. The web site also suggests hanging the antenna using a non-conductive monofilament line.

I would have liked having a few extra holes in the main bracket to facilitate other mounting methods but these could easily be added later.

I've had some mountaintop portable operators express concern that the small screws can be dropped and lost while assembling the antenna under difficult conditions. Carrying a few spares may be a good idea. Also, some hams have added longer screws and lock nuts to the design so that the screws are always captive.

Summary

The EE-3 antenna is a compact and easily portable antenna for operating on the 146 MHz, 222 MHz and 440 MHz bands. It is very handy for emergency and portable operation. The antenna is available direct from Evans Engineering for $24.95 plus shipping.

Reference

Evans Engineering web site: http://www.ee-3.com

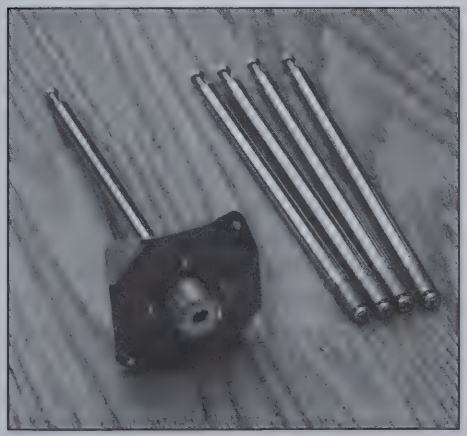


Figure 2—This is how the EE-3 antenna arrives right out of the box.

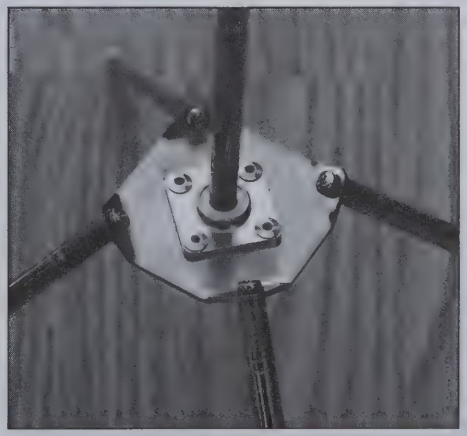


Figure 3—Close up view of the radials attached to the main bracket.

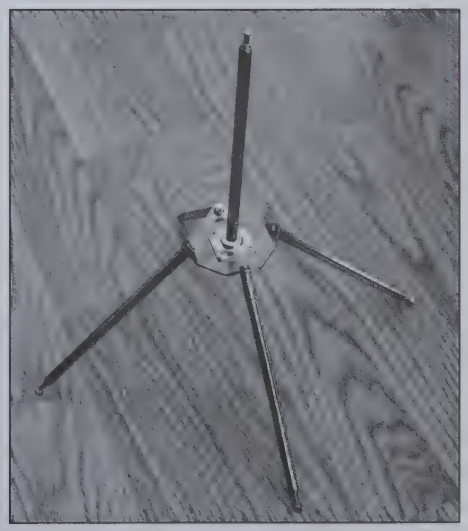


Figure 4—The assembled antenna with the elements set to minimum length.

QRP Clubhouse

Timothy A. Stabler—WB9NLZ wb9nlz@yahoo.com

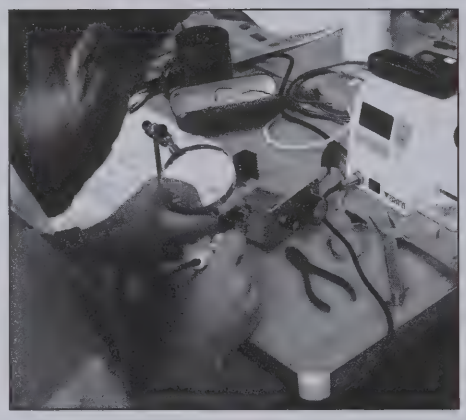
Greetings to the readers of this column. As I remember, I did have some comments in my last column about the house my wife and I are building. Here it is, several months later, and all I can say is the siding is on. My antennas go in next week (with the builder's consent, of course). As usual, I went to most of the QRP groups I had an E-mail address for and asked for info for this column. If there is any group I did not contact, and I know there are, please send me your email information and/or web information to me at wb9nlz@yahoo.com .

If your group is having any kind of a get-together, please let me know. This year, Ozarkcon will be May 1-2 in Branson, MO. Complete information is at: http://www.Ozarkcon.com. There will be a wacky key contest and a dummy load qso party. Seapac will be held June 5, 6 and 7. It is a month before Salmoncon, which is usually the same date as Lobstercon. Atlanticon was not held this year.

I know this is a column for club activities but I thought I would add some personal comments you may want to use for your club. This may be old stuff to you, but is rather new to me. There is a yahoo group called the "Minimalist QRP Transceivers" for those into Pixie and similar rigs. I find the comments to be very interesting. Another Yahoo group is the pqrp group. This is a place where amateurs in the Pacific Northwest can gather to chat about QRP and related issues. Anyone with an interest in QRP is welcome here. A third Yahoo site is the one that Mike Hunton, WA5PSE, told me about. It is the Central Michiana Tech Group, which he started. Although technically set up for people in the area of Central Michigan-Indiana, anyone can join. Have you logged in to get the Ham-Mag? Just go to http://www.ham-mag.com and read how to subscribe. It's free. I just received issue number 3 and find it full of good information. I find my E-mail subscription with the Midwest Homebrewers QRP group to be very good. Every once in a while, a member lists a new web site to look at. A link to a 40 meter kit is at: http://wiki.tak-40.org/start

A link to the English 80 SSB kits is at: http://www.mkars.org.uk/mkars80.html

Attendees of the Buildathon working on their projects with Steve Hartley, GØFUW, looking on.



A Buildathon attendee working on his transceiver.

Andy Cox, MØHLT, and his son Eden working on their transceiver at the Buildathon.

Both of these were submitted by Dar Piatt, W9HZC. Arnie Grubbs, KAØNCR, sent in the website for small SDR RX circuits at: http://www.qrz.lt/ly1gp/sdr

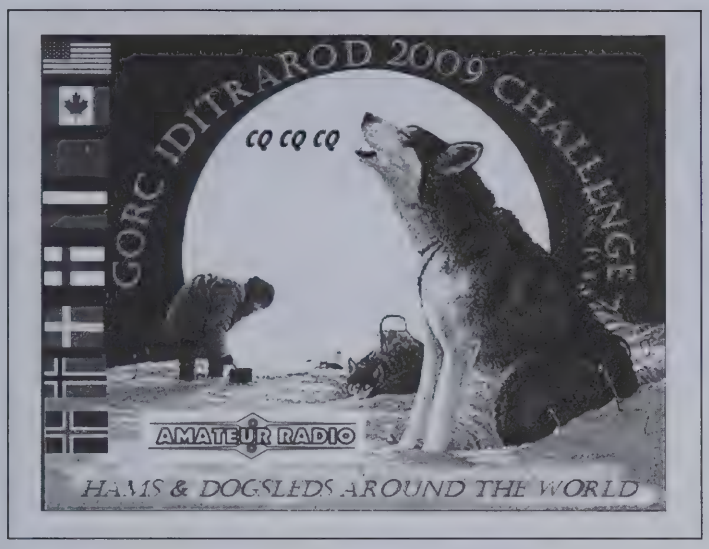
Another web site of interest is: http://www.QRPedia.com

Once in, you will find a lot of very good articles on many topics near and dear to us. The Croatian telegraphy club invites all radio amateurs and telegraphy lovers to join and receive e-mail. At the same time you sign up, you become a member of the European CW Association (EUCWA). Their website is: http://www.hamradio.hr/ctc

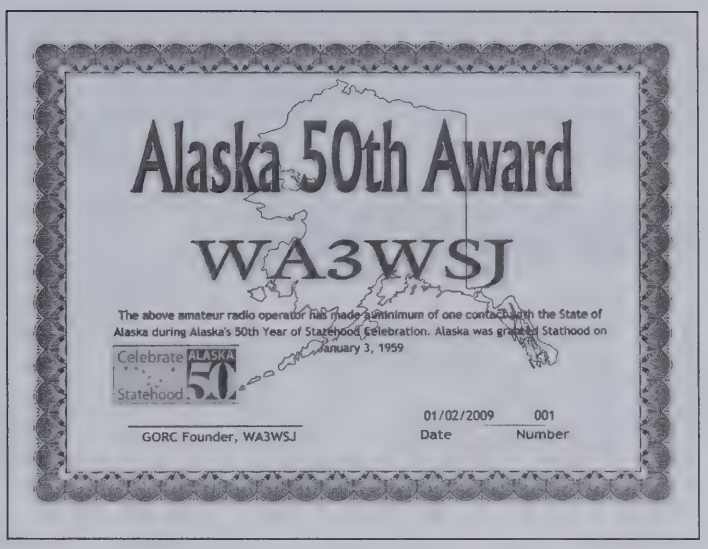
In the last newsletter I received from NAQCC, there was an interesting article on two members building a KX-1.

Bath Buildathon

Steve Hartley, GØFUW, sent in information regarding the second Bath Buildathon. In an earlier column, I wrote about his first Buildathon, which was very successful. The success of the second Buildathon was at least that of the first. Solder smoke was rising all day long as ten Brendon DSB transceivers were worked on at the same time. Two of the builders were full license holders looking to improve their radio construction skills.



The GORC Iditarod Challenge.



The Alaska 50th Award.

The rest were at the Foundation stage and were building their projects. All passed their exams the following week.

The first person to complete his kit was Wayne Thomas, MØWAY, who had traveled from Wolverhampton. Although he had come a fairly long way, the prize for furthest traveled went to Andy Cox, MØHLT. He had returned to his native Bath from near Penzance. Andy came to introduce his son, Eden, to the joys of homebrew.

Although Eden is only 7 years old and not licensed, he was wielding the soldering iron and tuning in signals on a newly completed receiver like a professional. Eden even exchanged a greetings message under the supervision of Steve Hartley, GØFUW, who had organized the event. Eden hopes to start a Foundation licensing class very soon.

The Bath event was filmed by a couple of local amateurs who happen to work in the broadcast industry and it is hoped to have a DVD available to help others run their own Buildathon events very soon. Brian Reay, G8OSN, chair of the RSGB Amateur Radio Development committee has suggested there may be a national Buildathon competition.

Steve admits that organizing a Buildathon is very hard work, but with a small team of helpers, any club can do it, especially when using a readily available kit. Steve was assisted by Mike Coombs, G3VTO, and Lewis Thomas, G4YTN. A personal note here. When you get on your computer, search "buildathon" in Google or Yahoo. Many sites and much information are to be found including a 5-page "Guide to Developing and Presenting an Amateur Radio Buildathon." I also found a reference written last summer about this upcoming Buildathon with several excellent links at the end.

Colorado QRP Club

After I had sent my last column in, I got as message from the Colorado QRP Club about their Great Colorado Snowshoe Run last December. This was basically a two-hour contest for CW only.

I did go to their web site and downloaded information on the Snowshoe Run, 2008 and hope to join in next time in December, 2009.

Great Outdoors Radio Club (GORC)

Ed Breneiser, WA3WSJ, reports the latest adventure of this club is the GIC-2009 or the GORC Iditarod Challenge 2009. In this event mushers (or radio ops) mush with a sled (radio) and dogs (antennas) around the globe on a predefined course. This event is fashioned after the real Iditarod Dog Sled Race in Alaska. The challenge started in November of 2008 and ended March 31, 2009. To give you an idea of the "route," in an E-mail from GORC, it was reported that Tommie Wood, N4YZ, had mushed through USA, Canada, Alaska, Russia, Finland, Sweden, Norway and Iceland. He only needed Greenland to cross the finish line.

The club is also now offering an Alaska-50 Award. This award is popular and any radio amateur may apply for it after making one contact with a station in Alaska. This year, 2009, is the 50th Anniversary for Alaskan Statehood. There are crazy endorsements for this award as well. The GORC website is located at http://www.wa3wsj.org/GORC.html/.

Guess that is about it for now. In my next column, I will be covering Ozarkcon. Again, please send me material about your club and what your is doing so I can include it with Ozarkcon. Also, as I stated earlier, please send me the addresses for your club's web site and/or your E-mail site. Thanks so much.

—72, Tim Stabler
WB9NLZ

■■

Supporting and encouaging local clubs is an important part of the QRP ARCI's stated mission!

Clubs are encouraged to use resources on the QRP ARCI Web site, including communicating with other individuals and clubs via the QRP-F Forum. Of course, club activities (and especially photos) should be submitted to Tim, WB9NLZ (wb9nlz@yahoo.com) for inclusion in this column.

The "Middle Forty" Transceiver—A Somewhat Better Forty Meter CW Transceiver

Harold Smith—KE6TI harold.smith@gmail.com

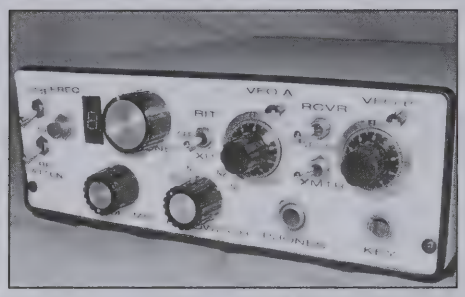


Figure 1—The "Middle Forty" transceiver.

A few years ago, I found myself with some extra time on my hands, and with the urge to build a radio that was a step or two above the very simple rigs I had been building up until then. This radio, which I dubbed the "Middle Forty," is the result (Fig. 1).

It is a VFO-controlled transceiver covering the first 100 kHz of forty meters. It features a digital frequency readout, a decent superhet receiver with several degrees of selectivity, a good transmit-receive sequencer, and a transmitter with a clean three watts output power. It includes optional RIT or XIT, and dual frequency dials for operating split, if desired. See Figure 2 for a block diagram of the entire transceiver.

Frequency control is by means of a varactor-tuned Clapp VFO (Figures 3 & 4). The receiver's intermediate frequency (IF) is 9 MHz, and the VFO tunes from 2 MHz down approximately 100 kHz. At this low frequency, there is very little drift, even from turn-on, and the receiver will stay on a stable station with no noticeable pitch change through any QSO.

Front panel controls and some switching allow either of two ten-turn potentiometers to control the VFO, and the different potentiometers can be switched to the VFO on transmit and receive, allowing split operation (Figure 5). There is also the option to switch in an incremental tuning potentiometer on either transmit (XIT) or receive (RIT). The two main tuning controls will each cover the entire range of the radio. The incremental tuning potentiometer tunes about +2 kHz from the frequency

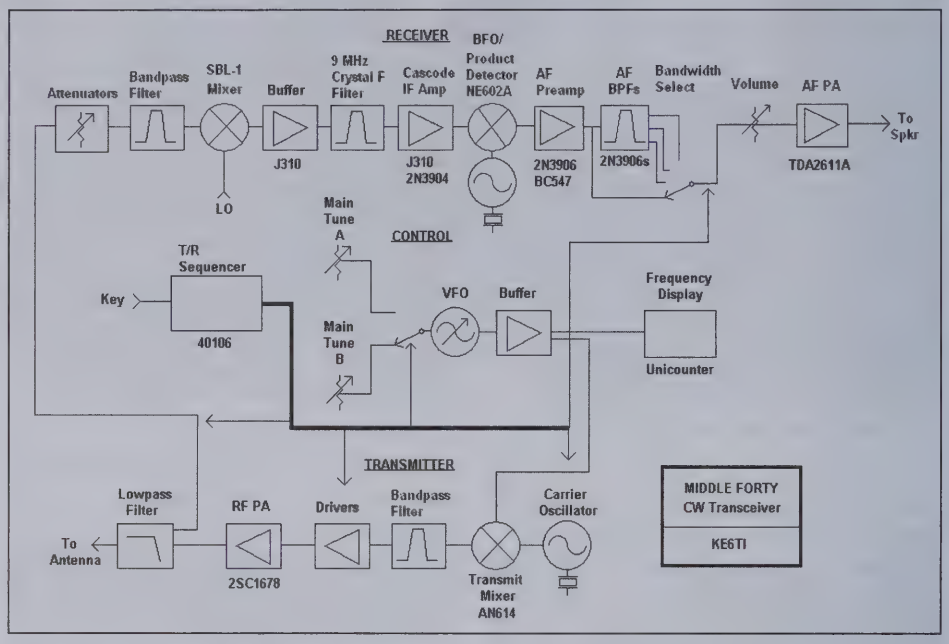


Figure 2—Transceiver block diagram.

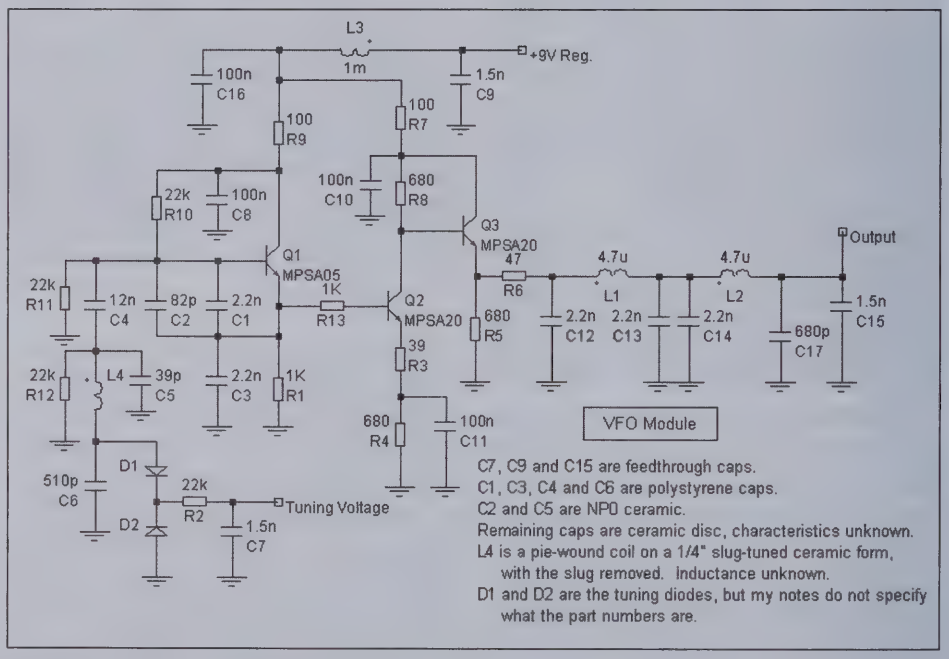


Figure 3—VFO schematic.

set by the main tuning.

The receiver is a single conversion superheterodyne (Figure 6). There are two switchable attenuators at the front end, one each of six and twelve dB, which can help with strong signals. After the attenuators is a bandpass filter, consisting of two resonators, bottom coupled. There is no RF amplifier, as one is not typically required at 7 MHz and their use can reduce strong signal handling capability. The first mixer is a Mini-Circuits SBL-1, a packaged dou-

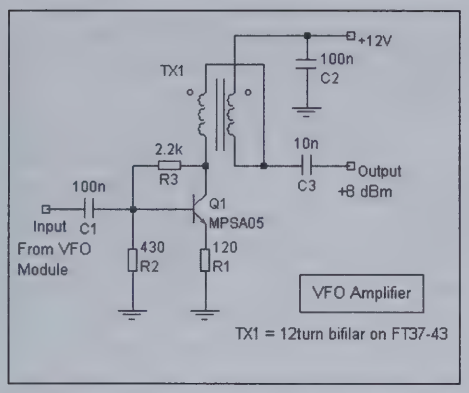


Figure 4—VFO amplifier.

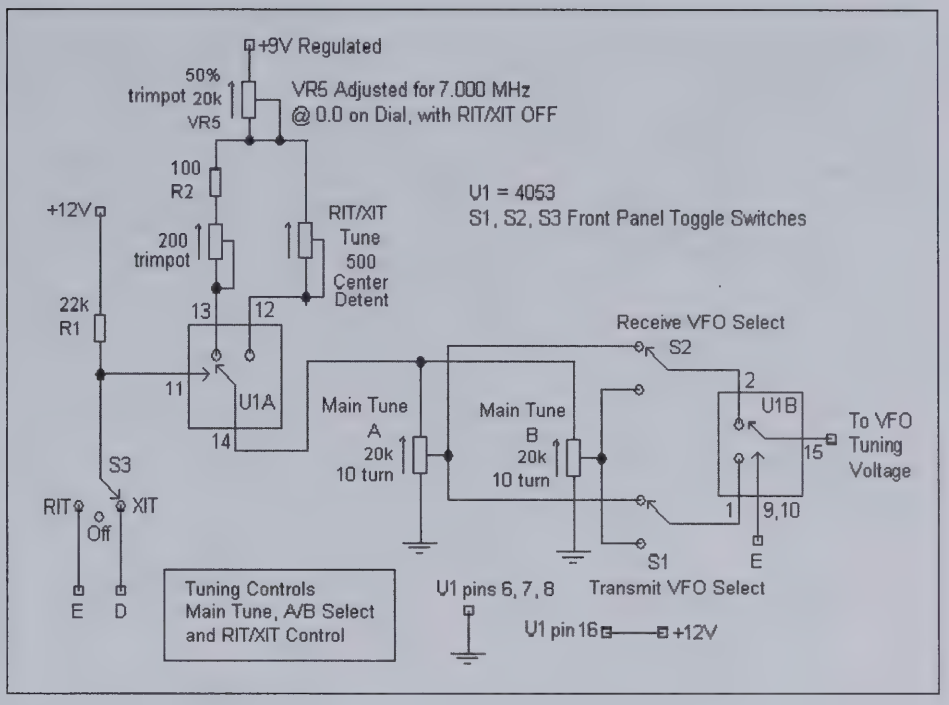


Figure 5—VFO tuning controls.

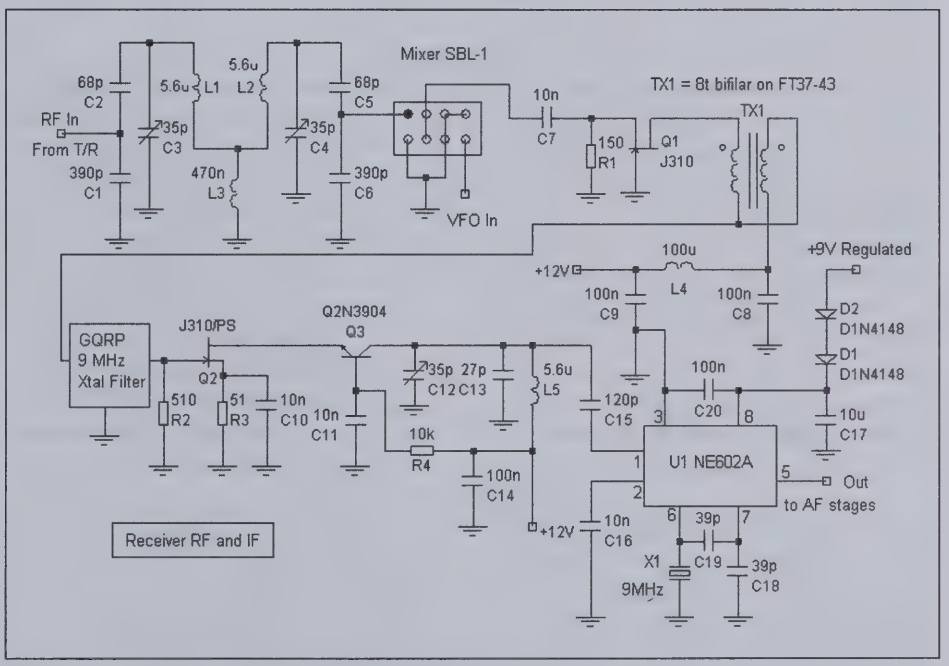


Figure 6—Receiver RF and IF sections.

ble-balanced diode ring mixer, which is followed by a grounded-gate J310 buffer stage providing the necessary wideband termination for the mixer. Primary selectivity is via one of the GQRP's 500 Hz CW crystal filters, which used to be available from GQRP club's web site. Unfortunately, when I last looked all they apparently had left were the SSB filters. However, there are other suppliers, or you could "roll your own."

Following the crystal filter is a single cascode IF amplifier stage, and an NE602A product detector and crystal-controlled BFO. Following the product detector is a stage of audio preamplification, and up to three switchable audio bandpass filter sections (Figure 7). The sections are identical and operate in series. Audio bandwidth is made increasingly narrow by progressively switching in more sections. A CD4052 multiplexer IC is used to select among the outputs of the bandpass filters, or no audio filtering at all. The Inhibit (INH) pin of the 4052 is also used to mute the radio on transmit. A highly attenuated sample of receive audio is fed around the 4052 to serve as a sidetone. I have found that I rarely use more than one stage of AF bandpass filtering, but when I was building the radio, of course, I did not know that. The audio output stage is a TDA2611A IC power amp, which can deliver more than a watt of audio to a speaker (Figure 8). I find the SIP (Single In-line Plastic) package that the TDA2611A comes in to be very handy for ugly construction, much more than DIP packaged ICs.

The transmitter starts with a 9 MHz carrier oscillator, which, along with the VFO, is fed to a Panasonic AN614 mixer (Figure 9). This is a probably-obsolete double balanced mixer IC that I happened to have on hand. It is similar to the more common MC1496, but with some on-chip biasing. A two-resonator bandpass filter follows the mixer. Two stages of amplification provide sufficient amplification to drive the final amplifier (Figure 10). A 2SC1678 power amplifier is the final stage of the transmitter (Figure 11). It is transformer-coupled to a seven element low pass filter which connects the transmitter to the antenna jack.

Transmit—Receive switching is done by a T/R sequencer that mutes the receiver before enabling the transmitter, and does not unmute the receiver until the transmitter has been disabled (Figure 12). It also starts the transmit carrier oscillator before powering the driver stage, and toggles the

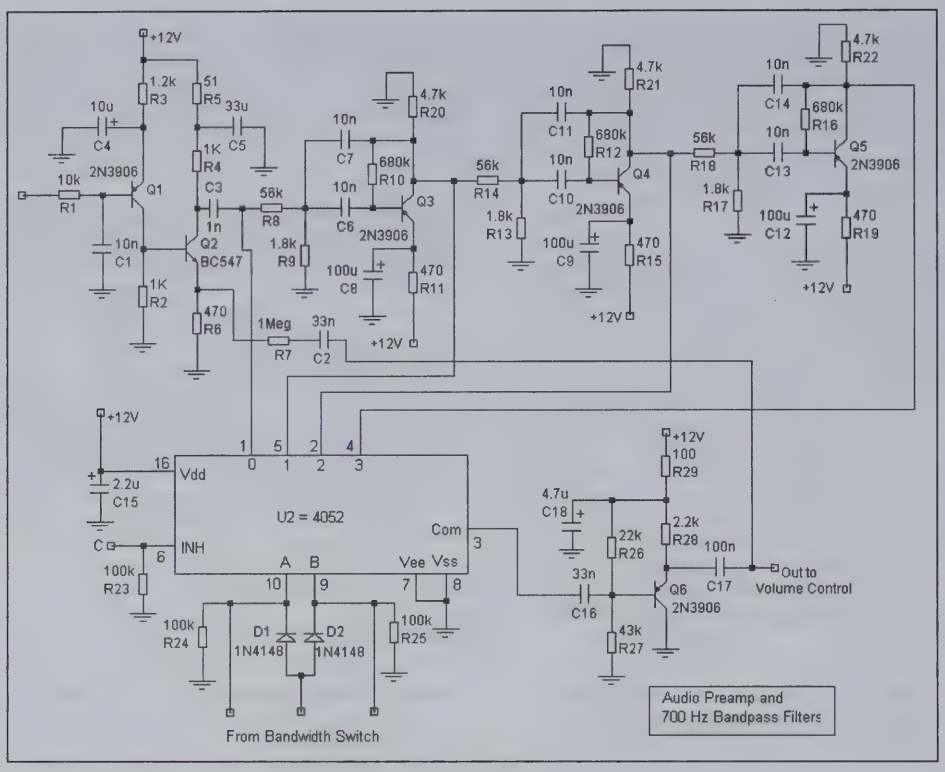


Figure 7—Audio preamplifier and band pass filters.

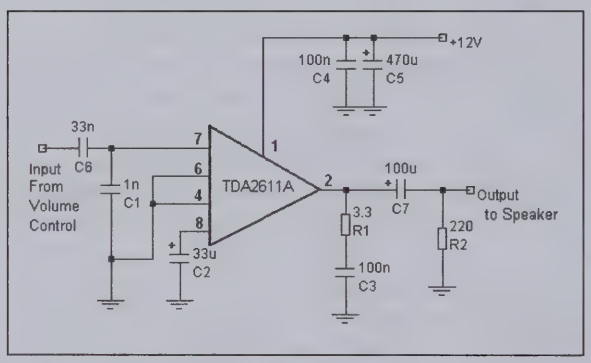


Figure 8—Audio power amplifier.

analog switches that route tuning voltage to the VFO. This is how the radio can operate "split." The sequencer is based around a 40106 Hex Schmidt Trigger IC and some RC timing networks. Diodes allow the sequence of switching to be different for transmitting and receiving. RF for the receiver is fed through the low pass filter and a conventional series-tuned T/R network before going to the attenuators, and the T/R network's switch transistor is also controlled by the sequencer.

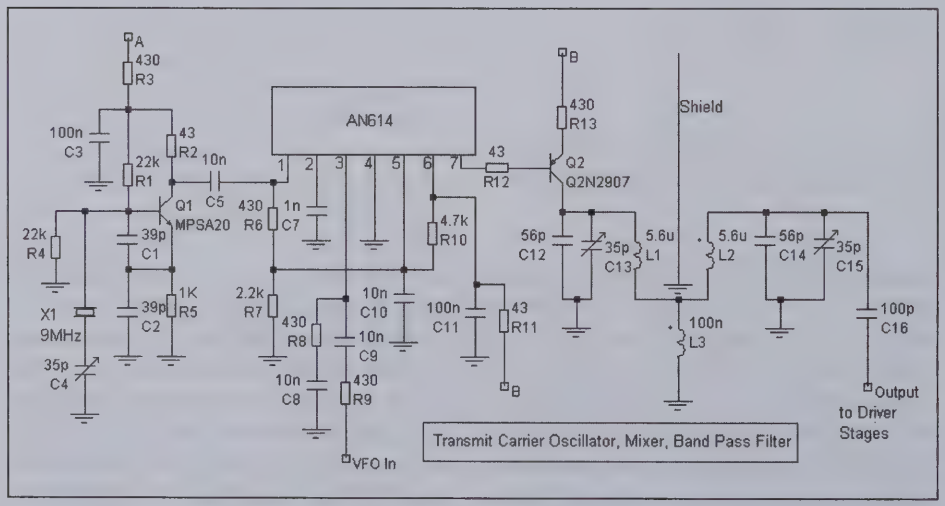


Figure 9—Transmit carrier oscillator, mixer and band pass filter.

The T/R sequence occurs as follows. Referring to Figure 12, a key down condition causes the output of U1 to be high. Diodes D1 and D3 then cause U2, U3, U5, and U6 to immediately toggle, which causes 12 v. to appear at A (transmit carrier oscillator) and C (receiver mute). At the same time, D goes low and E goes to 12 v, thus toggling the receive and transmit frequency controls (see Fig. 5). The R3/C3 network causes U4 to toggle slightly later, causing 12 v. at B, which switches the antenna to the power amplifier and turns on the transmit driver amplifiers. When the key is up, U1 goes to a low voltage. U4 then toggles immediately, causing the voltage at B to disappear, shutting off the transmit driver amplifiers and switching the antenna back to the receiver. Meanwhile, the inputs to U2 and U4 must now discharge through R2/C2 and R3/C3, causing a small delay before U2 toggles and removes voltage from the transmit carrier oscillator (A). At the same time, voltage D goes to 12 v. and almost immediately thereafter voltage disappears from E, thus toggling the receive and transmit frequency controls. Finally, because U2, U3, U5 and U6 must all toggle in sequence before the condition at C changes, the receiver unmutes last. All of this sequencing thus allows the carrier oscillator to come on a short while before the transmitter goes on the air. In reverse, the transmitter goes off the air before the carrier oscillator, thus allowing a steadier tone to be transmitted. Likewise, the receiver mutes first and unmutes last so that it does not react to minor frequency changes caused by switching.

The radio uses the Unicounter, as written up in the December, 2000 issue of *QST*, for its frequency readout. It was built from a purchased kit, and is the only part of the radio not homebrewed. The Unicounter is a clever, single digit digital readout that displays the frequency sequentially on a seven segment LED. I believe the PC board and a mini-kit are still available from Far Circuits. (www.farcircuits.net.)

The radio was built ugly style on a series of narrow pieces of PC board material, which were then mounted on edge on a larger piece of PC stock. The entire radio is contained in a cabinet salvaged from

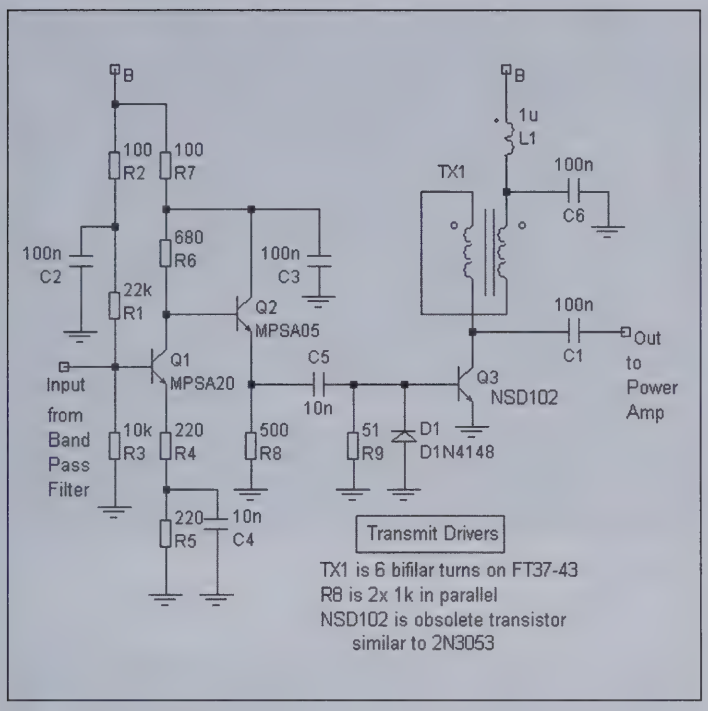


Figure 10—Transmitter driver amplifiers.

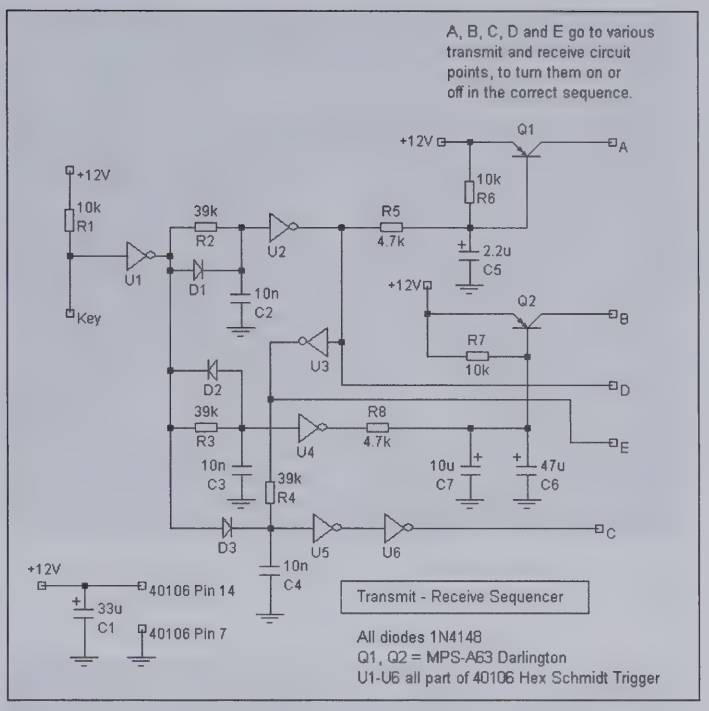


Figure 12—Transmit—Receive sequencer.

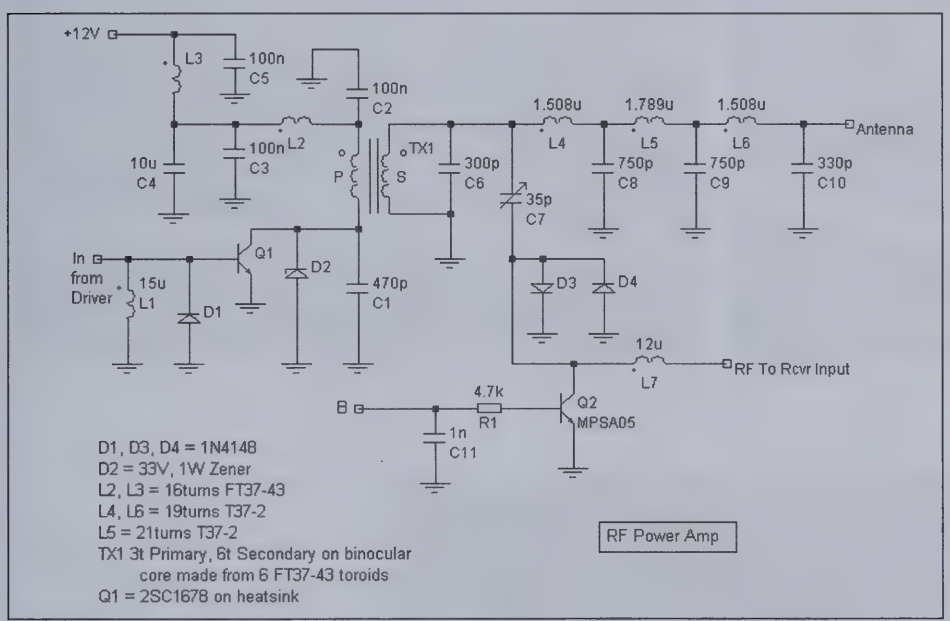


Figure 11—RF power amplifier.

Figure 13—Transceiver front panel.

some obsolete computer accessory. This radio was given an honorable mention at the FDIM's homebrew contest a few years ago as the "Ugliest Construction." The front panel is lettered with labels from a Brother label maker, and covered with clear plastic to protect them, as shown in Figure 13. Figure 14 shows the placement of the various sections of the transceiver. Figures 16 and 17 show the receiver RF and IF board and the transmit driver board, respectively, and illustrates how the transceiver was built in sections. Finally, Figure 18 shows the final amplifier and output filter, which face the rear of the transceiver.

When I build, I try to keep complete notes on circuits and construction. Unfortunately, in writing this article I discovered a few gaps in my notes. I hope this will not cause problems, since I doubt anyone would want to try to duplicate this radio exactly. More likely, I would expect that you might be able to glean a few ideas for a similar transceiver of your own design.

Since I built it, in late 2000, this radio has been the primary forty meter rig at KE6TI.

The remaining photos are on the following page.

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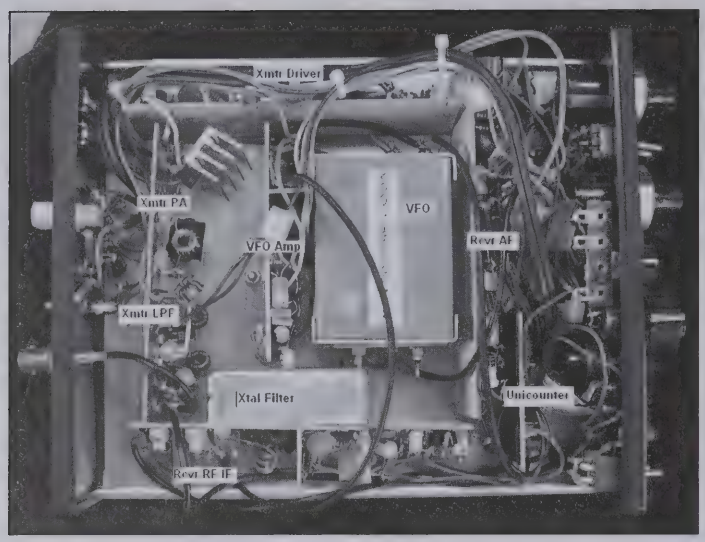

Figure 14—Inside the transceiver.

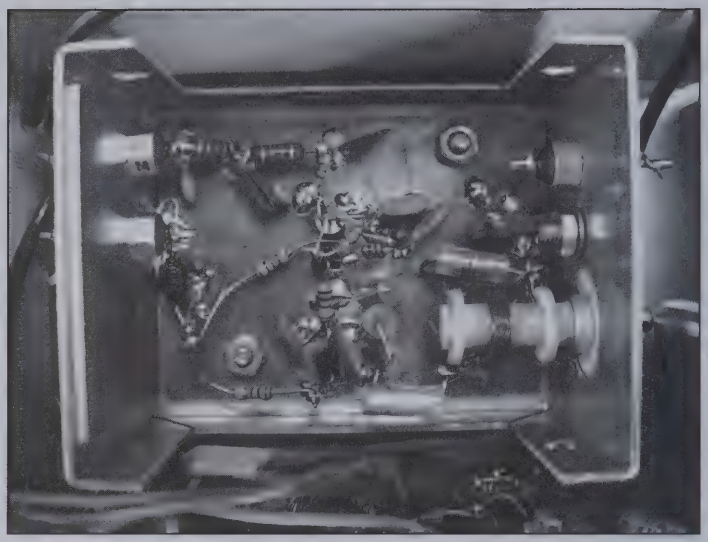

Figure 15—Inside the VFO.

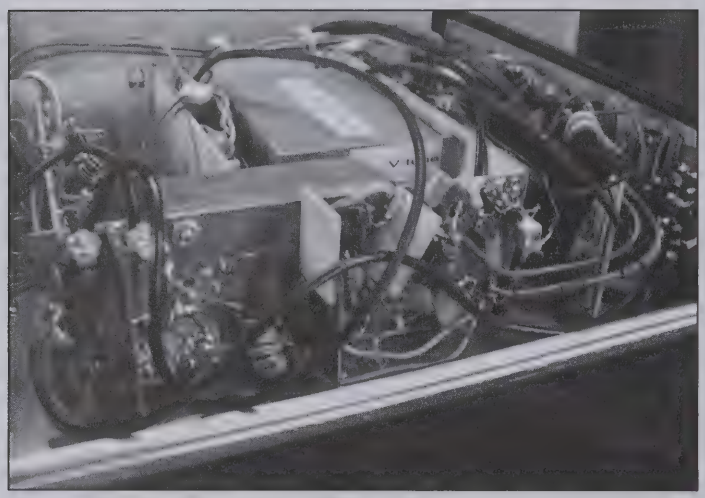

Figure 16—Receiver mixer/IF board.

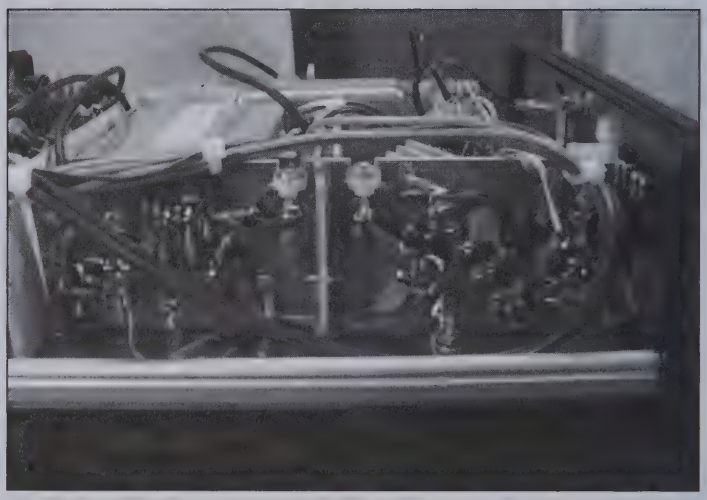

Figure 17—Transmit driver board.

Figure 18—Power amplifier and output low pass filter.

Hidden Antennas

Dick Pascoe—GØBPS/9H3JX dick@pascoes.plus.com

With the frustrating regulations about the siting of antennas outside houses these days, it is no wonder that we search for ways to hide what antennas we are able to use.

Those lucky hams like me that have a 60 foot tower with a 20 foot pole on the top are not the norm, but it wasn't always like that.

I currently live in an ideal location with a large garden that permits me a tower that tilts over, the 4 element Cushcraft sits nicely on top with the LF wire doublet hung below.

Some time before I moved to the current QTH, I was unable to put up anything that resembled an antenna. Whatever I tried, the next door neighbour complained.

I had two choices; give up my radio or cheat. I decided to cheat and stick two Churchillian fingers up to the neighbour. This was the woman that complained about TVI from my transmitter, I fitted a choke on the input to her TV and it was cured. Two months later she complained again; I could only imagine that the choke had failed, but how? No, it had not failed; she decided she didn't like the look of it hanging off the back of her TV and threw it away!

My rig at this time was a nice FT707 modified for use on top band, and of course 100 watts out. It was about this time that I met Rev Dobbs G3RJV, who told me that "A ham that has a wire antenna squirts his RF weakly in all directions; those with beams are lucky, they squirt their RF weakly in only one direction." I was hooked and turned the power down to QRP levels and stayed there. Unfortunately the neighbour still complained, not about RFI but nasty looking antennas.

I then decided that the only way to beat this "lady" was to be really devious and to cheat heavily so that she would NEVER guess I had an antenna up.

The first try was to wait until she went shopping. I then ran a long wire along the top of the adjoining fence to the end of the garden, about 45 yards away. The counterpoise was laid on the ground on my side of the wall between the two houses.

This worked well for a while until her daft cat decided to join the fun. This cat, with an IQ of about minus 5, would often run down our garden path towards the house, jump off a low wall, bounce off the top of the refuse bin and from this bound onto the adjoining wall and into her garden. This day, the lid was off the bin!

The cat let out such a loud scream that the neighbour jumped up on the wall and not only spotted the cat in the bin amongst all the rubbish but she spotted my wire antenna too. That (and the cat) had to go! This wire had been OK(ish) but not good. More devious thoughts were needed.

The next cunning plan was to run a loop around the guttering of the house but we were "semi detached," i.e., two houses attached, this meant the wire had to go over the roof where the two houses joined. Fine, it worked, just. No DX but I did have contacts, which is better than no antenna and no operating.

Over the next few months, I tried several other ploys such as my 30 foot ladder casually leaning against the house but tied there at the top. After a week or so, I was asked by the boss if it was safe, would it fall into the neighbour's garden and damage something? "It is tied at the top," I said, how can it fall? It couldn't stay, but I managed to work a couple of DX stations with that (almost) vertical.

By this time the neighbour was in mourning for dead husband and not very interested in my antennas so I decided to try out a few more. Remember that ANY antenna WILL radiate some energy; you just have to get the best you can.

A knock at the door one day amazed me; a couple of local hams offered me a 40 foot tower with quad antenna and rotator for free!!! Yippee, all I had to do was take it away from the home of the ham that had just died. Luckily I knew a man with a truck and cutting disks and a few hours later the whole lot was in my back garden.

Of course like many countries you cannot just put up a 40 foot tower in your garden without planning permission from the local planning authority. Mine said "no way, Jose!" so several UK pounds poorer I ignored them and the neighbour and planted the base of the tower in the soil. Surprise, surprise just a few days later it looked like the leaning tower of Pisa and it had to come down—fast before it came down even faster!

Out shopping one day with the boss, I had a GREAT idea for an antenna. I dashed back into the supermarket and asked for the manager and a short while later had the OK to borrow two shopping carts. The FT707 in the back of the car was coupled via an ATU and ladder line to the carts separated by about 20 feet. No way was this going to work, was it? Yup, three contacts while she loaded the shopping and read her paper, best DX from the UK into Russia.

At the side of the house was the vent pipe from the bathroom; it was made out of plastic. A wire from the shack over the roof and lowered down the vent pipe with a small weight gave me other options.

A little later we decided to keep chickens as we love fresh eggs. There is nothing better than getting up in the early morning, kicking the dew off the lawn and heading for the chicken coop. The "sweet" smell of chicken S**T as you open up and the birds flock out for their first feed of the day is unforgettable. Opening the roost hatch and collecting the fresh eggs is even better.

So; where do fresh eggs and chickens come into the antenna frame? What is the cage of the chicken pen made of? Yes; chicken wire, will it radiate? Yes, of course, first contact into Germany.

After the fiasco with the cat and the neighbour on the left I decided to try the fence on the right of the house. The top was only about four feet above ground but a 45 yard wire with counterpoise looked decidedly possible. Run from the ground floor shack window next to the fence it was never spotted by the other older neighbour for the remaining years I lived there.

Visiting one of the local hamfests a few months later, I spotted a thirty foot extending pole that would fit neatly into the garden. A few guy ropes and it looked great standing there with the British Union Flag flying in the breeze at the top. Who would imagine that it was also my 30 foot vertical?

A few weeks later when everyone was used to this pole I added a triangular loop of wire that just happened to be great for 40m. This loop was hooked on the ends of the gutter of the house and the top of the

pole and it was about 30 foot AGL.

This was in late 1987 when one of the biggest gales to hit the UK passed through our area, trees were falling everywhere with tiles flying off the roofs of nearby houses. We lost a few too. What was worrying was looking out of the rear window to see the 30 foot pole, now bent almost double. As it moved in the wind the top was bouncing up and down as it turned. My car was parked right underneath this bouncing Betty with, at times only an inch or so separating the two. Luckily they didn't touch but I got very cold and wet moving the car out into the road!

Over the years I tried many, many different ideas on antennas, many of which I wrote for British magazines over the 1990s, some were up for weeks or even months, some just for a few days.

I love playing with antennas, with the large garden I have now, I have tried almost all the types there are from Sterba Curtain to Windom, G5RV to Bobtail Curtain.

The funniest recollection in my attempts to find the ultimate antenna was one day browsing in my collection of antenna books. I found one that I liked the look of and got out the tape measure, iron and wire reel. After about an hour of putting it together I went back into the shack to check on a few more details.

I finished reading the article and sat down in shock, the antenna unfinished. I realised then that I knew the author quite well, actually very well, too well in fact. (Are you ahead of me yet?) I had built the antenna some years before and written the article for the book. Oh well, nothing changes!

The absolutely best antenna I ever had at my previous house didn't exist. It was invisible to all casual viewers. It couldn't be seen!

Let me explain; A close friend worked for the local telephone company and, after several months of persuading, agreed to put up a new "telephone wire" for the house. This wire started in the shack, went up the wall to a proper mount, went across two neighbour's gardens to a telegraph pole in the road about 80 yards from the house. It then went around that pole and about 60 / 70 yards to another pole further up the road. My friend refused point blank to cross the road with this wire and add a further 60 yards. A 45 yard counterpoise ran along the fence.

I had a totally "invisible" "Long Wire" antenna about 150 yards long with counterpoise. No one would imagine that these wires were anything but phone lines! Until the neighbours complained about hearing CW on their phone. Wasn't me—was it! How could that get on the phone line? How would I know? These wires were still there many years after I had moved house too.

The moral of the story, get out there and experiment. Whatever works for John Doe may not work for you but unless you cut, sample, re-adjust, retune etc you will never get the ultimate antenna (if it exists).

If you cannot get the ultimate antenna up in your plot—CHEAT, all is fair in love, war and Ham Radio…..

●●

N5ESE's QRP Workbench

Monty Northrup—N5ESE n5ese@io.com

The Problem

This project came about as the result of the "evil eye." Ok, I may be exaggerating just a little, but perhaps you've had the same experience, especially if ham radio is expected to live demurely side-by-side with other household activities. Let me explain...

My frequent homebrew projects usually end up being assembled on the kitchen table. In our small house, it's the only available large, flat surface. In the interim between when I start a project and finish it, the XYL and I usually eat out, or use lap trays. The XYL is extremely indulgent in this regard, for which I'm grateful. The problem arises when a project gets interrupted mid-stream, or when I have a series of projects that need to be worked on. It's not really practical to pack it all up into a box, then unpack it a few days later when I have the time to work on it again. But the "it's not really practical" excuse only goes so far. Most recently, after occupying the kitchen table for 3 weeks, the XYL asked when I would be ready to clear the table. When I began mouthing the same excuses about not being "quite finished" with the last project, I got the "eye" followed by a big sigh. It was time to do something, and that was clear.

Figure 1—The finished workbench, ready for action.

Now, in our house, the XYL really doesn't mind me working on the kitchen table; in fact, she uses it for her projects as well. What she does mind is looking at the stuff all over the kitchen table when I'm not actually working on it. What I needed was a slick way of organizing it so that it could be quickly and easily stored out-of-view while I am not actually working on it.

The Solution

A cheapy rolling tool cart forms the basis for the solution. By "cheapy," I mean light duty. The selected tool cart probably would make a really lousy mechanic's tool box, because the sheet metal and the plastic casters are too light, and the drawers do not have ball-bearing slides. Any real mechanic would scoff at the "cheapy" construction. But the fact is a heavy duty tool cart, in addition to cost-

Figure 2—Detail of the workbench table and trim.

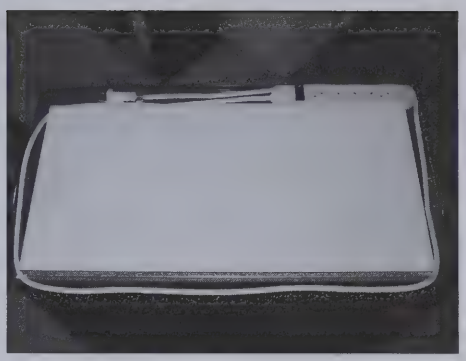

Figure 3—The workbench top and power strip.

Figure 4—The workbench in storage mode.

ing two or three times as much, would be too heavy and cumbersome for our purposes. Since we'll only put lightweight electronic tools and parts in our tool cart (hand tools, pc boards, sorted parts, soldering irons, and test cables), the lighter, cheaper model is just about right. The model I selected was priced at $69.95 at the local Home Depot.

To the stock rolling cart, I added two trunk handles ($5 each), one on each side. While I still planned to work at the kitchen table, I wanted a little table space with the tool cart in case the XYL had bigger plans for the kitchen table (or just got to it first ;-).

I bought two 12 × 24 shelves ($4 each), the kind with white masonite exterior, which cleans well and provides a hard surface. I also bought a 30" continuous hinge (piano hinge), which I cut to 23-1/2 inches. By aligning the two shelves side-by side, and with careful marking and drilling, I was able to join the two pieces via the piano hinge. Then, the tool cart's top surface was drilled and the shelf was mounted to it, such that the new "table" surface could be folded back within the original form factor of the tool cart, or folded out when needed for a work surface. I was somewhat surprised at how sturdy the extended table was. Figure 1 gives a pretty good view of the QRP Workbench with the table folded down (extended), with a typical dining room chair alongside for scale.

To finish it off, I mounted some white plastic "outside-corner" molding all around the foldout shelf. Now those little surface mount diodes won't roll off the table and into the carpet, never to be seen again. Figure 2 is a picture of the shelf/molding construction.

Finally, I mounted a power strip in the space behind the shelf, which just happened to be perfectly sized for it and allows the cord to be wrapped neatly around the top when the unit is in its "storage" configuration. Figure 3 is a picture from the top, showing the power strip and shelf alignment (closed), and the cord coiled for storage:

Figure 4 is an overall view of the unit, all closed up for storage:

Summary

The QRP Workbench has plenty of storage for those partially-completed projects. I used the larger bottom drawer to store my digitally-controlled soldering station and handle and accessories, including solder-tweezers, spare tips, solder, and solder-sucker.

The small top drawer is perfect for hand tools, and the drawer under it for keeping partially built assemblies, and china bowls for holding small parts and hardware. The mid-sized drawer immediately below, provides a convenient place for storing test clips and jumper cables, a few BNC patch cables, a small box of adapters, and the digital multimeter. I even have one large drawer left over, for who knows what?

When I want to work on something, I can just pull it out of the drawer, and put it on the kitchen table, or on the QRP Workbench's table, if need be. I can plug the cord into the nearest available outlet, and have my power strip for the soldering iron or bench supply or other test equipment.

And when I'm done, I scoop it all up, dump it in the drawers, fold up the table and coil the cord, and roll it out to the garage, where it stays out of sight until I need it again.

And so there was peace over all the land from that day forward...

...And no more evil eye.

73, Monty, N5ESE

●●

You Can Write for *QRP Quarterly*!

Every QRPer and homebrewer has a few personal "tricks" or interesting experiences to share with fellow hams. As you begin putting your idea into writing, contact the Editor or an Associate Editor (listing on page 3)—they will provide the guidance you need.

Sailing with Ham Radio on the Great Lakes

Bill Kelsey—N8ET n8et@woh.rr.com

I have published a few articles in some of the Amateur Radio publications over the years, but the one that got the most comments was the article in the Fall 2006 issue of *QRP Quarterly* "Sailing with Ham Radio in the North Channel." It covered our summer on our sailboat "Wings" as we sailed in the North Channel and Lake Huron. This is a continuation of that story.

Our sailboat "Wings" is a 36' Beneteau model 361. It needs 5 feet of water to keep the keel off the bottom (2 feet less than what was in my basement at the end of our 2007 trip!). We cruise at about 6.5 knots—whether we are sailing or using the engine. The electrical system is a 12-volt DC system consisting of three large 12-volt lead-acid batteries. The batteries are charged when the engine is running, or by a charger when we are tied up at a dock and plugged in to shore power. When we are at anchor, we now have about 100 watts of solar panels that keep the batteries going. They were installed at the beginning of the 2007 season. There are two panels in parallel that feed the batteries through a charge controller designed by Mike Bryce WB8VGE.

In the Fall 2006 article, I described the antenna system as being either an MP-1 portable antenna, or a 40 meter inverted vee supported by a DK9SQ mast. Those antennas were taken down while underway, so I was not able to operate unless we were at anchor or tied up at a dock (where the RF noise was usually so bad I could not operate anyway!). At the beginning of the 2007 season, I "upgraded" the system to a 33' piece of wire that went from the stern at an angle up towards the top of the mast. The 33' wire was fed through an auto-tuner and was left up all the time, so I was able to operate while underway. I only really operated underway in 2008 when I was finally able to bring the mic and headset up on deck with long extension cords. I don't do well below deck while underway—HI!

Wings and a kayak—our local transportation.

Going through the locks into Lake Superior.

2007—Lake Superior

In 2007 we traveled from our home port in Lake Erie to Duluth, MN at the west end of Lake Superior.

We left our home port on June 20, traveled 1640 nautical miles, ran the engine for 303 hours, and returned home (the first time) on August 23, and finally got the boat home September 12.

The trip was fairly uneventful from the ham radio perspective. I did make a number of QSOs and maintained a schedule with a friend at home who was keeping an eye on the house for us. This turned out to be rather important at the end of the trip!

It took over a week to actually get to Lake Superior. We crossed Lake Erie, sailed up the Detroit and St. Claire Rivers, and then up the Michigan side of Lake Huron. At the north end of Lake Huron we crossed the lake and traveled up the St. Mary's River to Sault Ste Marie. Along the way we met sailing friends who were also going to Duluth, and we all stopped in Sault Ste Marie for a couple of days to gather as a group to head out on Superior. We had our first experience going through a lock as we entered Lake Superior on the 1st of July. The lock was the same one used by the large lake freighters. It was quite an experience to enter the lock, have the water come in to equal the level of the upstream lake, and then motor out onto the upstream side. As we sailed into the waters of Lake Superior, I noticed the water temperature was 49 degrees. We started the day in shorts and tee shirts (after all, it was July 1) and ended in three layers of sweat shirts and hats with ear flaps! We knew we had arrived on Superior!

It took about 10 days to sail along the south shore of Superior to get to Duluth. We had expected wind and fog, but found most days were dead calm, and only one morning had any fog. There was one day when the wind clocked up to 70 knots (in the marina) for most of the day, but we were tied up at the dock for the day to wait out the blow. There were two foot waves inside the protected marina. That one very windy day combined with all the calm days meant that on the average we had great sailing wind all the way along the south shore!

I noticed an interesting effect as we traveled on the south shore on the calm days that I have not seen on any other lake. I would see very strange looking boats on the horizon, and as they came closer I realized that what I had been seeing was the inverted image of the top of the superstructure of the boat as it approached my visual horizon. Eventually the boat would get close enough that inverted image would disappear, and we would see the (upright) boat in the water. There were one or two times when a boat would pass us beyond our visual horizon and we would only see it inverted. I assume the effect had something to do with the cold water and a cold layer of air just above the water.

We spent several days in Duluth at a Great Lake Cruising Club Rendezvous. While we were there we met up with AAØZZ and WØUFO for dinner. It was good to see those two guys in their home state of MN—quite a change from our usual meeting at Dayton!

Leaving Duluth, we headed towards Thunder Bay, Ontario by way of Isle Royale. We had planned on spending one night at Isle Royale, but when we got ready

A moose feeding at Isle Royal.

The seaplane that brought our engine mount to Isle Royal.

N8ET working on the engine cooling system.

to leave Isle Royal, we discovered we had a broken engine mount. That meant we could not use our engine to move the boat—or charge the batteries! This was the point in the trip that the solar panels really proved their worth. The cooling system for the freezer with all our food runs on the 12v DC electrical system. The batteries can keep the system going for a day, but then they need to be recharged. We were stranded at Isle Royal for 5 days, and the solar panels kept the batteries charged up the entire time we were there. The cooling system was using the batteries faster than the panels were charging them, but the panels meant we were able to go 5 days rather than one. I am convinced that if I had paid attention to the angle of the panels relative to the sun, the panels would have kept up, but there were too many fun things to do on Isle Royal! The panels are mounted flat on the boat, and the boat was swinging at anchor, so it was difficult to set them for a maximum charge rate.

The Rangers on the island let me use their single phone line to call in an order for an engine mount which was air-freighted to Houghton MI, and from there it was flown to Isle Royale on a seaplane. It made the final quarter mile of the journey to Wings in my kayak. Isle Royale was a great place to get stranded. We saw moose, signs of wolves (no wolves though), got to know the rangers and saw every one of their programs, hiked the island, and generally had a great time!

We left Isle Royale and headed to Thunder Bay. We expected to find a fairly small town, but instead found a major city—a real eye opener. One of the natives explained to us that Thunder Bay is on the back side of all the Ontario maps, so it never gets noticed. Ontario is a "really big place..."

Thunder Bay was the jump off spot for the north side of the lake. Looking back, the north side of Superior is one of my favorite places we have taken our boat. It is very remote, and we would often see only one or two other boats in a day of sailing. Compare that to the 10,000 registered private boats in our home harbor in Lake Erie! The shoreline and views were wonderful. Our only concern was watching out for the shallow spots that could rise up out of the very deep Lake Superior water. The depth could change from over 600' to under 5' in less than a boat length.

Along the north shore we took a side trip to Nipigon and crossed the 49th parallel to get there. We even got a certificate from the Mayor of Nipigon! We spent a couple of days in the Slate Islands where we saw Caribou. They are ugly little critters! When I saw the first one, my reaction was that it was some sort of a donkey with a deformed head!

It was past the middle of August when we finally reached the north east "corner" of the lake. Our last day of sailing to reach a spot just south of Marathon, Ontario was through 10-12-foot waves—an interesting day on the boat! I had been keeping daily skeds with AD8P on 40 meters (no cell phone coverage!) back in Ohio while we traversed the north side of the lake and the night before he had told me there were flood warnings in Findlay. I asked him to check our basement, and the next morning he had said it was "bone dry." That night however, he began our sked by asking if I was sitting down.... He then informed me that our basement had 7 feet of water in it, and we needed to come home. He had not even been able to get to the house that day because of the water levels.

We left the anchorage early the next morning and spent the next two days sailing in the fog to get to Sault Ste Marie. The fog lifted long enough at the end of the first day for us to see Michipicoten Island where we anchored for the night. The fog came back along with darkness before we went into the anchorage. We used the GPS/Chartplotter along with the radar to enter the channel into the anchorage. I saw the entrance buoys as we entered the channel, and could make out the outline of objects on shore along the channel on the way into the anchorage. The next morning the fog was even thicker. We could see less than two boat lengths in any direction, and it was hard to tell where the water ended and the fog started. I have never seen fog that thick! As we left the anchorage, the only things we saw were the channel marker buoys at the end of the channel. It is the first and only time I have experienced spatial disorientation on the boat. I felt like the boat was turning, but trusted the radar and GPS to get us out on open water. The instruments worked, and we headed south to Sault Ste Marie.

Our trip across Whitefish Bay at the east end of Superior took us along the commercial shipping channel after dark. The lake freighters are all lit up and looked like a small city overtaking us as they sailed by. We arrived at the locks about 1 AM, and after waiting for three freighters to lock through we got out turn and arrived at the marina about 3 AM.

We left Wings at the Marina the next morning, rented a car, and drove back to Findlay to begin cleaning up after the flood. The flood and cleanup is another entire story. The entire Kanga US inventory was lost—but the basement got cleaned out!

About 10 days later, a friend and I drove the rental car back to Sault Ste Marie and

Heading under the Mackinac Bridge into Lake Michigan.

The lighthouse on South Manitou Island—typical of many we saw on the trip.

sailed Wings back to Ohio. It took us about 7 days—2 of which had gale warnings posted. Fortunately the wind direction was such that we were able to take advantage of it, and we had two days of the highest average speed we have ever had on the boat.

Looking back on the trip, I did not do much ham radio, but 40 CW did get a very important message through that would not have easily come any other way. There is still a large part of the Lake Superior shoreline we want to visit, and someday we will get back.

Before and after our trip on Superior, we often heard comments about the Edmund Fitzgerald. After we got home, I checked our course on a chart, and discovered we had sailed almost directly over the top of the shipwreck site as we rushed back to our flooded home in Findlay.

2008—Lake Michigan

Our 2008 trip was a circumnavigation of Lake Michigan. We began the trip on June 30, traveled 1562 nautical miles, ran the engine for 234 hours, and returned home August 13, 2008 was the year I finally got N8ET/MM active on the ham bands!

This was the year I got the radio set up in a configuration I was able to use while we were underway. As I mentioned at the beginning of the article, the antenna was a 33' almost vertical piece of wire. The bottom was fastened to the stern of the boat, and was fed with an autotuner that matched my FT-857D. The tuner was mounted in a storage area in the stern. The top of the wire was fastened with lightweight line to the top of our 50' mast. For a ground system I ran several radials in the bottom of the boat that were cut to 1/4 wavelength on the bands I expected to use. I also tied the ground system to the keel and the DC ground on the boat. During the trip I had many comments about how strong my signal was. A vertical antenna in the middle of a lake works fairly well!

We again traveled up the Michigan side of Lake Huron. Along the way I got the radio going one evening while we were anchored in Presque Isle Harbor. I activated several lighthouses there and made a few QSOs. The trip north along the Michigan shore took a little longer than expected because one marina we stopped at was so full of weeds that we sucked some into our raw water (cooling water) intake, and it destroyed the impeller in the water pump. I spent the better part of two days becoming intimately familiar with the cooling system in our 27 hp diesel engine. We finally got it going again as we entered Lake Michigan under the Mackinac Bridge and through the Straits of Mackinac.

Our trip in Lake Michigan took us to Beaver Island, South Manitou Island, and on down the Michigan side to Michigan City, Indiana. The highlight of our trip took place the morning of July 22 as we left Holland, Michigan headed for Michigan City. As we left Holland I had put a course to Michigan City into our GPS and turned on the autopilot. The course was a straight line of about 70 miles that would take us several miles offshore as we headed south. It was a beautiful day for sailing—blue sky and a good breeze with the wind quartering from behind us. Shortly after we left Holland, I noticed what I thought was an orange colored sail on a boat over the horizon directly ahead of us. The "sail" remained directly in front of us as we sailed on our course. Eventually I decided it was not a sail, but was some sort of a flag—probably one of the marker flags that are used on commercial fish nets that are in the Great Lakes. I then realized that it could not be a net flag because they are small enough and low enough that they do not remain in view for more than 15 minutes or so, and we had been watching this flag for more than an hour. I began to see an object under the flag, and I could see the flag was waving back and forth more than the wave action would cause it to do. As we got even closer, I could tell there was something more in the water under whatever was holding up the flag. At that point it occurred to me that what I was seeing could possibly be a person standing on an overturned boat waving a distress flag. I asked Tina to get the binoculars and "see what that flag is" that was in front of us. She looked and confirmed (in a completely different tone of voice!) that it was an overturned boat in the water with someone standing on it waving a flag with another person clinging to the boat in the water!

At this point, we were still 15 minutes away from them. I started the engine and dropped the sails so I could maneuver when we arrived, and so they (hopefully) would realize we had seen them. They told me later that when I dropped the sails they knew they had been spotted. The microphone at the helm had been intermittent (I had not brought a soldering iron along this trip!) so Tina called the Coast Guard from below. Normally, these types of calls are picked up at a regional CG station and

The famous Chicago skyline, as seen from Lake Michigan.

An abandoned lighthouse between Green Bay and Lake Michigan.

relayed to a local unit that responds. At that particular time, the personnel at the Holland CG station were doing paperwork by their radio. They told us later as soon as they heard the call—which included lat/lon coordinates—they were sprinting to their rescue boat.

When we got closer to the overturned boat, we realized there were actually 5 people involved—not two. The good news was that they were all ok—just cold and wet. They had been in the water for over 2 hours, and were beginning to get quite concerned because several boats had gone by and not seen them. They were quite happy that we had arrived! After circling their boat from a distance a couple of times, I pulled up beside them headed into the wind, and they all swam to our boat and climbed up the swim ladder. I had expected them to come one at a time, but when I said "OK" they all headed for our boat at the same time. In less than 60 seconds they were all on-board. The winds were about 15 knots, and the waves about 3 feet when we made the pick up—it was interesting!

The Coast Guard arrived moments later, and their EMT came aboard our boat. The 5 boaters were suffering from the initial stages of hypothermia—the water temp was 70 degrees—so they kept them on our boat for about 30 minutes to get them warm and dry. When they were ready, they all transferred to the Coast Guard boat for a fast trip to shore. They pulled up along side and everyone jumped across. It was a good thing they were all in decent shape!

Tina and I spent the next 45 minutes or so picking up floating fishing gear and several pairs of shoes before we headed back to the Holland CG station for a de-briefing. When we arrived we found there were crews from three local television stations waiting for us, along with a local paper. We made the local news that evening, and found out later we even made the news that night on the TV stations in NW Ohio. The Coast Guard presented us with an award in February. July 22, 2008, is a day we will not forget—and there were five guys in Michigan who cheered for Ohio State in "the game" this year!

We did get out of Holland later that day—but did not get as far south as planned. Over the next 10 days or so we got to the south end of the lake, spent a night in Chicago, visited Milwaukee and other spots on the Wisconsin Coast and enjoyed the good sailing weather. It seemed like every port we visited in Wisconsin was having some sort of Festival. We were well fed along the way.

At Sturgeon Bay we crossed over into Green Bay. This is where the radio finally came into it's own. With all the islands in the area, there are a lot of lighthouses. I tried getting the air on as we passed a couple of lighthouses. It turns out that the day I picked to get on was also an activity day for the lighthouse crowd. I was a pretty popular guy for the rest of the trip. A group of Amateur Radio Lighthouse Society (ARLHS) members followed me for the rest of the trip, and I made over 600 QSOs and activated over 60 lights between Esconaba MI and our home port in Lake Erie in the next two weeks. The weather was good enough I was able to operate from the cockpit by using extensions for the mic and headset from the FT-857D. When a new light came into view, I would get on and say, "Is this frequency in use?" and more often than not WB3AAL (ARCI and QRP-L regular) would pop up and ask what light I was at now! It was great fun, and I will certainly do more when we go out on the boat again. There was a huge stack of QSLs waiting for me when we arrived home!

The trip back down Lake Huron to home was uneventful—except just missing being near another sinking sailboat as we approached the Straits of Mackinac. We heard the Mayday call, but there were two other boats much closer than we were that came to their assistance, so we continued on our way.

Plans for 2009

We had planned on going around Lake Ontario this year, but like everyone else, the economy has changed our plans. I have started working again, and my wife is actively looking. We are planning to start a business selling and installing solar panels and wind generators this summer, so if any of you are thinking about getting solar panels—please contact me! This means we will not be taking any extended trips this summer. We do plan on sailing on the weekends, and may go for a week or so in Lake Erie. We have never explored our home lake—maybe this will be the year!

The photos included with this article lose a lot when they are printed in black and white. I will try to put some photos on the web before the article is published. Check www.kangaus.com/trip to see what some of the places we visited really look like!

—73, Bill, N8ET

Polar Bear QRP Pligrimage to the Mountains

Edward R. Breneiser—WA3WSJ Breneiser@dejassd.com

Mohican Outdoor Center sign.

W2TQ, NU3E and N7UN at the start of the hike.

W2TQ, NU3E and N7UN hiking the Appalachian Trail.

NU3E & W2TQ hiking the ridge on the AT.

W2TQ on the AT in snow and ice.

January 16th, 2009 and it's time for another Polar Bear Moonlight Madness Event or PBMME, and once again a few Polar Bear Ops are making their annual pilgrimage to the Mohican Outdoor Center or MOC located in the Delaware Water Gap, NJ. On this occasion, N7UN, NU3E, W2TQ, K3YTR and WA3WSJ will be making the journey. WA3WSJ and K3YTR have the Woodlands Cabin booked for the weekend and the other Polar Bears will arrive on Saturday and stay in the Black Oak Lodge.

The temperature outside is around 10 degrees and dropping fast. The temperature inside the cabin is a balmy 39 degrees! We quickly turn on the heater and after a few hours it's up to 62 degrees in the cabin.

This would be the highest the cabin temperature would get for the entire weekend. After setting up the cabin, Ed, K3YTR and myself get down to some operating. I tune up my Kenwood TS480SAT into a 20m dipole and start looking for water! Yes I'm looking at my waterfall screen as I'm operating PSK31 on 20m. One CQ and I snag a contact. That night the outside temperature dropped to –10°F! But, Ed, K3YTR and myself are, "snug as a bug" in our sleeping bags. The hardest thing to do is to crawl out of a warm sleeping bag into what feels like frigid temperatures. Actually the inside cabin temperature is around 59°F. Both Ed, K3TYR and I, WA3WSJ, decide a ride down the mountain to the local diner in Blairstown, NJ for breakfast as it sounds like a very good idea so off we go.

After breakfast we start back to the MOC. Once inside the cabin I again start working PSK31 and start making contacts on 20m around 14.070 MHz. By 10 a.m. or so I hear Guy, N7UN aka Rainman who is Polar Bear Number 15 calling us on 146.52 MHz simplex. Then John, NU3E aka The Rookie calls us on 146.52 MHz also. A few minutes later Joel, W2TQ is calling and a "den of bears" is forming.

After all the Polar Bears arrive at the MOC on Saturday morning, all but K3YTR start to prepare for the hike up to Catfish Fire Tower on the Appalachian Trail.

By around 11 a.m. we all are ready for the two-mile trek up the mountain to Catfish Fire Tower. As I hike up Rattlesnake Swamp Trail, I can hear all the bears talking about past hikes and how much fun we have doing this.

Yes, isn't often that a group of hams that have, let's say grey hair or no hair, get together and play radio and enjoy the outdoors. I, WA3WSJ, feel blessed to have had this experience with this group for the past four years or so. The January Polar Bear Moonlight Madness Event has become a sort of pilgrimage for all of us in this group of bears. We all have busy lives, but for one weekend in January, we all make the pilgrimage to the Mohican Outdoor Center to hike, play radio and most importantly greet each other. It's a time to catch up on the lives of each in the group and just have FUN!

We will hike up Rattlesnake Swamp Trail to where it meets the Appalachian Trail (AT). We will then turn left on the AT and hike out to Catfish Fire Tower. The hike goes well and all arrive on top of the ridge on the AT in fine shape, but what we see next is just beautiful! The top of the mountain is covered with about three inches of snow and it looks like a winter wonderland. To top it all off, there's a half-inch coating of ice on everything on the moun-

Polar Bears at Catfish Fire Tower.

W2TQ and N7UN at Catfish with K1 radio.

WA3WSJ operating at Catfish Fire Tower with KX1.

tain—just gorgeous! We all just stop and take in the beauty all around us. What a sight to see and we have the place all to ourselves.

As we hike out to the fire tower, I spot Joel, W2TQ, in a small batch of shrubs that are just coated with snow and ice. I stop him and ask him to turn around for a picture. I think this picture says it all.

We are hiking in a "winter wonderland." As you might have noticed, Joel is wearing sunglasses—why? Well, with all the snow and ice all around us, the sun glare is just brutal without sunglasses on to protect your eyes. Later that warm sun would leave us and the temperature would start dropping on top of the ridge. I mean drop like a rock!

Our group of bears arrives at Catfish Fire Tower and N7UN, NU3E, W2TQ and WA3WSJ start erecting Guy's N7UN 20m dipole and his 40m dipole.

Guy uses the fire tower as a nice support for the antennas. The fire tower also has a coating of ice all over most of it so the climb up is slow and steady to prevent a fall, etc. Once at the fire tower, the weather looks sunny and there's almost no wind, but this balmy 25°F weather will soon leave this group of Polar Bears. Erecting the two dipoles takes longer than expected. Funny thing about cold weather—it always takes much longer to do a simple task because of the cold. Your body just doesn't want to work as efficiently as it does in warm weather. I don't think this is a linear function, but rather a log function—hi!

We decide to use Guy's N7UN dipoles to operate as he can only use one at a time. After all is setup, John, NU3E, starts his hike back down the mountain to operate in the Black Oak Lodge. Guy uses a picnic

Saturday Night Dinner with the Polar Bears.

table to setup his Elecraft K1 and operate on 40m. After a few CQs, he makes a contact with some Canadian Polar Bears and is very happy about it. Joel, decides not to operate and walks off taking pictures of this beautiful winter wonderland today.

About this time the sun leaves us on the mountain and within five minutes I'm feeling a whole lot colder—hi! I connect my Elecraft KX1 to the 20m dipole up at 50 feet in the center and don't hear any change in the noise? I check the SWR and all is fine. It looks like 20m has said bye-bye for the day. I call CQ for around ten minutes, but not one answer. Well, that's how it goes some days. So with no takers and the temperature dropping fast, I decide to call it a day on the mountain as the temperature is now in the teens.

The picture you see of me, WA3WSJ, lying in the snow was taken by Joel, W2TQ. I had two fleece jackets on under my fleece-lined ski jacket—hi! No contacts, but plenty of memories and stories.

The hike back to the MOC was fast as the temperature was dropping by the minute. As you can see, we followed the AT on top of the ridge to Rattlesnake Swamp trail and then down the ridge to the MOC. We all had a good time on the mountain and really enjoy operating outdoors in the cold for the Polar Bear Moonlight Madness Events. But, what we really enjoy is the fun and social events of the weekend. Yes it's fun to operate together, but as Guy, N7UN, says all the time, "it's all about the stories." Yes, I always have stories to tell people of our adventures on the AT and at the MOC. What a great hobby using QRP to stay active all year round!

Saturday night found us all going out for a nice dinner. This was the first time for this, but it probably won't be the last. We all really enjoyed that meal together and reminiscing about past adventures.

After dinner, we all went back to the MOC and watched the Movie Appaloosa on a big screen. It was a nice way to end the evening. Sunday morning John, NU3E, made his famous waffles with strawberries and cream—hum hum good! Ed, K3YTR and I, WA3WSJ, just had to drive down to Black Oak Lodge for this breakfast. As usual John, that breakfast was just delicious.

It was a great weekend with friends and we hiked and played QRP! Unfortunately, Guy, N7UN, will be moving back to the west coast soon. We will all miss his dry humor very much! It's funny how you get to know guys you hike and operate with over the years. It's those subtle phrases that come out of our mouths that define us when we all get together. I'm so glad and lucky to have hiked with this group of Polar Bears.

Thanks Guys,

Ed, WA3WSJ

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How to Operate Pedestrian Mobile

Paul Signorelli—WØRW/pm w0rw1@msn.com

It is really exciting to operate on HF while you are hiking into your favorite back country area.

Operating "Pedestrian Mobile," which I will call " /pm," is a very challenging and rewarding activity, especially using QRP. It is difficult to explain /pm to hams in foreign countries, so sometimes I tell them that I am operating Back Pack Mobile or Walking Mobile. You won't have to look for trees to support your antenna anymore; you will look for trails without trees.

Let's start out with the options of which radio to use. You will probably want to use one you already have. You just need to configure it for trail operation. You will need to find a nice backpack or shoulder carrying bag that can hold your radio with its battery, an ATU and maybe a keyer. The easier it is to get everything together in one bag, the easier it will be to use and the more you will use it. A radio that draws low power is essential.

Figure 1—AN/PRC-319.

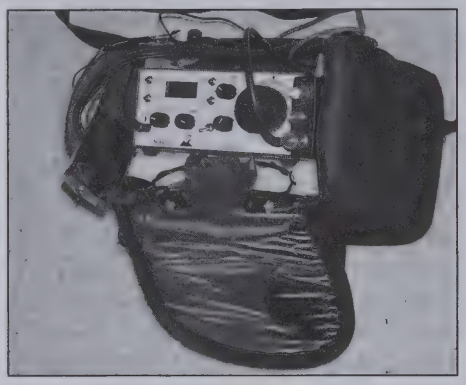

Figure 3—The Wilderness Sierra transceiver.

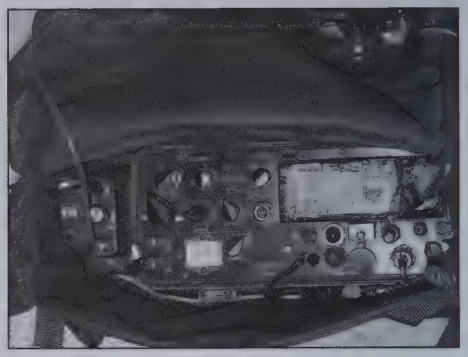

Figure 2—AN/PRC-64.

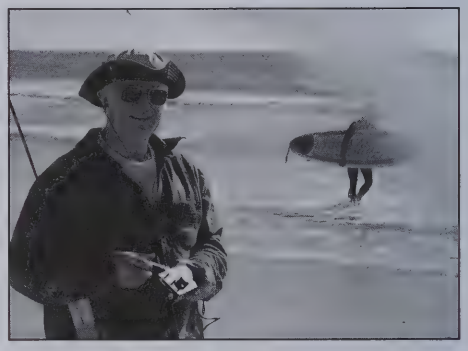

Figure 4—Elecraft KX1.

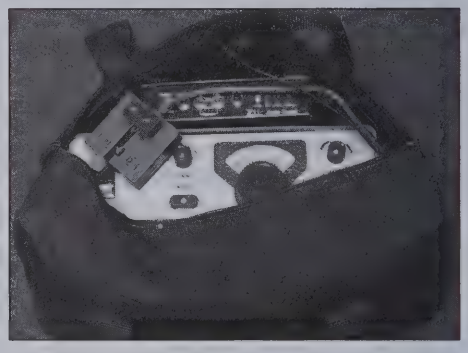

Figure 5—Heathkit HW-7

CW or SSB

QRP SSB on a short whip is a real challenge in these low sun spot minimum years. Soon it will be very easy to work DX on 10 meters with low power. 20 watts is really the minimum needed for successful SSB/pm these days on the lower bands.

CW has great advantages (as QRPers know). QRP/pm is easy, but you will have to be able to copy CW in your head and start sending CW while walking. This will force you to copy words and not letter by letter. PSK/pm would work well but the duty cycle is much higher.

Good Backpacking Radios

Here is a sample of the radios that I use for /pm:

The PRC-319 military backpacking radio is shown in Figure 1. The good news here is that it is set up for /pm right out of the box and can transmit SSB as well as CW. It can transmit at 5 watts or 50 watts. But at 50 watts, the batteries won't last long. The bad news is that it weighs 20 pounds, which is heavy for a backpacking radio, and only operates on fixed frequencies. There is more information in the April 2006 *QST* or in *Practical Wireless* for January 2009.

Figure 2 shows the PRC-64, a military spy radio from the Vietnam era. At 5 pounds, it is also lighter than the PRC-319. It operates on 40 or 80 meters, but is limited to 5 watts on CW. I generally use an Elecraft T1 tuner and a Curtis keyer with this radio. More information is available in the *ARRL Low Power Communications* book, 3rd edition, by R. Arland.

Another of my favorites is in Figure 3, the popular Wilderness Sierra radio. It also runs 5 watts, on CW only. However, it operates all ham bands, providing you don't mind switching out the band modules. The Elecraft T1 works well with this radio also.

Weighing in at only 1 pound is the Elecraft KX1-4 transceiver in Figure 4. This great little radio will work on 80m, 40m, 30m, and 20m. The KX1 puts out 1 watt on an internal battery pack, but can put out up to 4 watts with an external power source. Sometimes I clip the KX1 to my left wrist (Wristmitter). I usually hand hold the KX1. It is the simplest to use, everything is built in.

Figure 5 shows an old standby, the Heathkit HW-7. At 4 pounds, it operates on 40/20/15 meters and puts out about 2 watts. The transmitter portion is crystal controlled. I generally use it with an LDG Z-11 tuner.

Figure 6—The World War II Paraset.

Figure 7—My Vestenna in operating position.

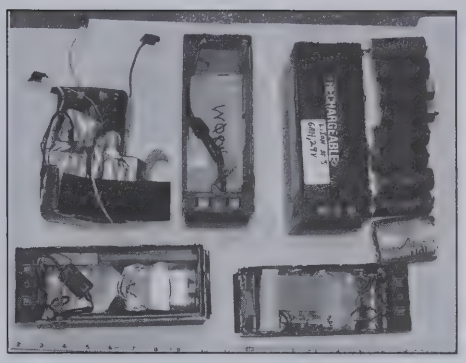

Figure 8—Some LiIon batteries.

Finally for lovers of vintage radios, there is the Paraset shown in Figure 6. My Paraset is a replica of the World War II era spy radio of the same name. It got that name because it frequently parachuted in with the incoming spy. It appears on the cover of the *Low Power Communications* book mentioned previously. The Paraset will operate on 80 or 40 meters, transmitting 5 watts. The one tube transmitter is crystal controlled, like the PRC64. The receiver is a two tube, regenerative variety. Tubes were carried in the lid of the case when not operating, and plugged in each time it was operated. I generally hold the Paraset in my hand and use a backpack for the battery supplying power.

There are also hams using lots of other radios. I would probably get lots of letters if I didn't mention the FT817 and IC706. And there are probably a variety of shirt pocket radios in Altoids tins.

Antennas

I use a 10 foot whip with a center loading coil, with a top hat for lower frequencies. The top hat causes people to stare at you and you wish you had your tin foil hat on. Your XYL won't walk with you more than once when the top hat is in use. The whip is attached to the back pack frame for backpack radios, or I just stick the whip in my rear pocket for shoulder bag radios and hand held radios like the KX1. See Figure 7. My vest has a little loop at the shoulder to secure the whip (Vestenna). The loading coil is usually about 3 feet above my head. My loading coil is wound on a nylon Fram fuel filter. Longer whips are better but harder to use when on a hike. You might also consider the new antennas from BuddiePole.

The antenna will also require a counterpoise, which I call a drag wire. The drag wire length should about 10% less than a quarter wave length. The drag wire should have a break-away connection, like a banana plug. On mountain tops I always use a shorted quarter wave stub for a drag wire to protect the input of my radio from precipitation static. I never use a drag wire longer than 30 feet, because it gets a little too hard to handle (drag).

The simplicity of tuning with an automatic tuner is a perfect fit for /pm work. The tuning is done once and not retuned unless you walk over different terrain, like snow or salt water. The radio should be connected to the tuner with coax but the whip is connected to the tuner with only HV wire. The counterpoise wire goes directly to the tuner ground.

Before you take the antenna out for the first time, set your rig up on a step ladder and tune your antenna/drag wire for maximum on a field strength meter. This will make sure you are getting those few watts out into the ether, and may prevent harm to some of the simpler rigs which expect 50 ohm impedances.

Batteries

This is a good opportunity to ditch those heavy SLA's. Newer LiIon cells provide /pm operators with twice the energy and half the weight of a NiCad pack. I don't use Li Poly packs because they are a bit harder to handle. I use Sony hard carbon LiIon cells, like those in Figure 8. The new A123 Lithium Iron Phosphate cells are excellent too.

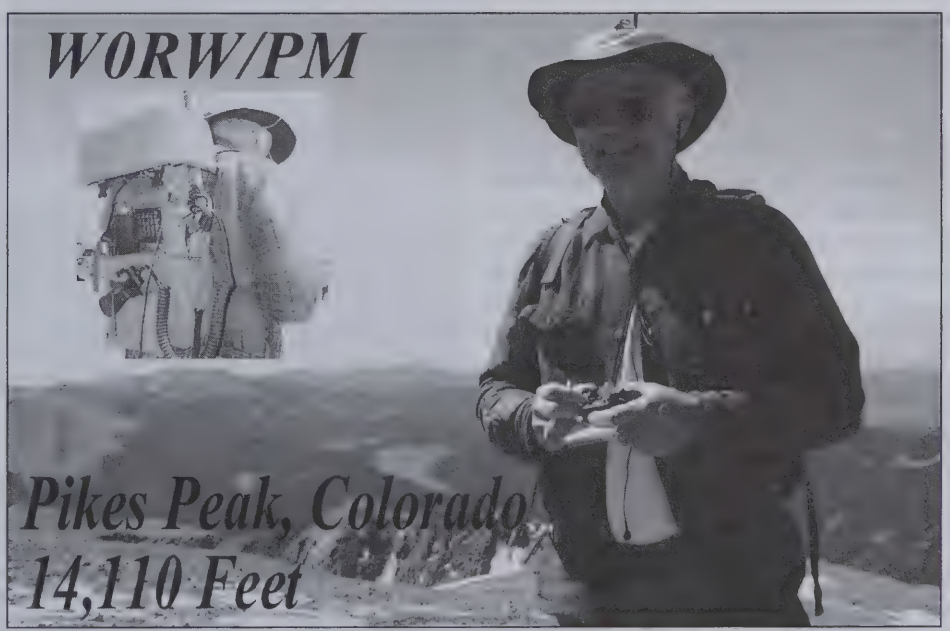

Figure 9—WØRW's QSL has a photo taken at the summit of Pikes Peak.

You will have to procure a new LiIon charger too. I have been using batteryspace.com for my LiIon components. BuddiePole also has LiFePo4 battery packs. NiCad's and NiMH's are still popular cells, but may tend to weigh a bit more for the same amount of portable energy.

Awards

If you work six Pedestrian Mobile or Human Powered Mobile stations you are eligible for the HF Pack Six Pack award. You can work WAS/pm or DXCC/pm if you want a new challenge.

Additional HF/pm information is at http://www.HFPack.com.

Of course, if you are going after these awards, you will need to have a log. This is a bit difficult. I use a small note pad, a log clipped on my cuff or taped to the under side of my KX1. I usually just log the call sign and name and also use it as dupe list in a contest.

Locations

As they say in real estate, location is everything. The best places to operate are on ridges. Deep valleys are not good. I have had the opportunity to operate /pm from National Parks, inside volcanoes, on the Colorado Trail and the on the Santa Fe Trail. These /pm locations will generally be free of BPL, CFL, power line noises and have no covenants. See my operation on Pikes Peak in Figure 9.

Hazards and Safety

Safety is always important. With amateur radio, you not only have to think of your own safety, but also the safety of others.

There are two concerns with the safety of others and pedestrian mobile radios. First, it is quite possible for the tip of your antenna to make contact with a passing pedestrian. So, always be mindful of where your antenna is with respect to everyone around you. Secondly, you need to be concerned with RF safety. Considering the power levels you will probably be running, it is unlikely that you will breach any safety limits related to RF energy density. Nevertheless, it won't hurt to check, and you can make the calculation easily using the University of Texas RF Safety Calculator at http://n5xu.ece.utexas.edu/rfsafety/. Even if you don't reach legal safety limits, you may still want to exercise some special care regarding transmitting around non-hams. After all, almost anyone you meet might have a defibrillator or pacemaker, and it could react to power levels that are far below the legal limit.

As for your own safety, be mindful of your surroundings and don't operate near low power lines or during lightning storms.

There can be further dangers to /pm, if you don't exercise a little care. Possible problems are RF burns to the hand and ear, lightning, joggers, horses, coyotes, bear, etc. I was approached by a bear once as I was working Estonia on 20 meters at midnight with my KX1.

The good news is that all kinds of interesting things can happen to you. Once while I was walking down the street at night, operating on 80 Meter CW, I noticed a house light blinking on and off. It was me! I was tripping some SCR lamp inside the nearby home.

See you on the trail,

—Paul, WØRW/pm

●●

Reggie: A One-Transistor Transceiver

Michael J. Rainey—AA1TJ mjrainey@gmail.com

"In anything at all, perfection is finally attained not when there is no longer anything to add, but when there is no longer anything to take away..."

—Antonine de St. Exupery, Wind, Sand and Stars

Reggie, in Figure 1, is a one-transistor, 80m, QRP transceiver designed for the minimalist. It's a "dual-action" QRP radio; not only does it transmit a small signal, but the receiver converts every signal on the band into QRP. The specs include:

~ 100mW output power
Fessenden heterodyne receiver
Tunes from 3503 to 3563kHz
Full QSK
RIT
"Chirpless" keying
Clean output signal.

Figure 1—The "Reggie" transceiver.

I've named this radio in commemoration of the great Canadian radio pioneer, Reginald Fessenden. The circuit diagram appears in Figure 2.

Transmitter

One-stage transmitters share a common difficulty; the necessity for clean keying generally limits their operation to quartz crystal-control on the lower bands. While it is possible to "rubber" the crystal, in order to retain reasonably good keying the total frequency excursion for each crystal is severely limited.

I recently found myself wondering if it might be possible to escape this limitation. The design offered in Reggie represents my solution. It's a simple idea that hearkens back to the earliest days of radio. The oscillator runs continuously. While the transceiver is receiving the oscillator delivers most of its power into a dummy load, with the remainder used to feed the receiver BFO. When the key is depressed this RF energy is re-routed to the antenna via a simple switching network comprised of a pair of 1N4007 rectifiers. This technique allows a wide-range, ceramic resonator

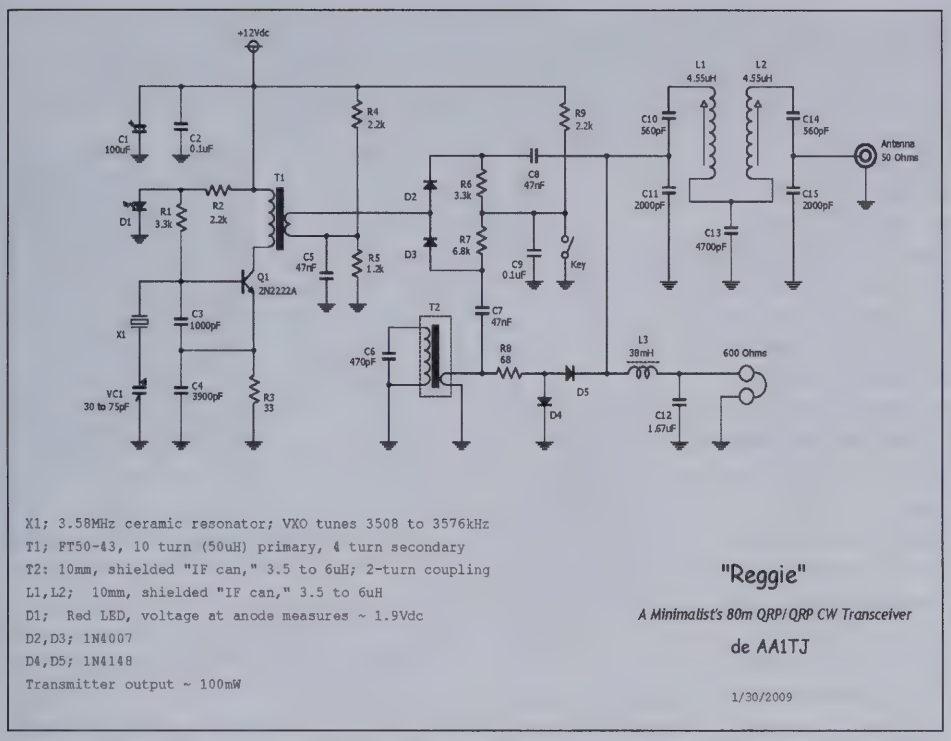

Figure 2—Schematic diagram of the Reggie.

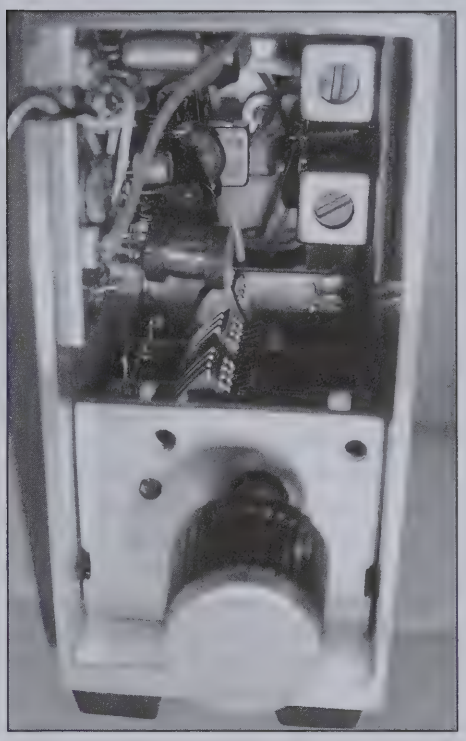

Figure 3—Inside the Reggie.

VXO to be used as a single-stage CW transmitter without the disadvantage of keying chirp.

The VXO is a standard Colpitts oscillator. A forward-biased LED provides a stable DC bias to the base as well as the backlight for the tuning dial. The values of the Colpitts feedback-divider capacitors—C3 and C4—are made large in order to "swamp" the capacitances external to the ceramic resonator. I used an FT50-43 core at T1 only because that's what I had in my junk box. The collector DC input power at Q1 measured 300 mW. This indicates an efficiency of approximately 28%.

With VC1 set at the middle of the frequency span, and with the key-up, adjust the slug at T2 to peak the oscillator signal at the 2-turn link. Now, re-adjust this slug until the oscillator frequency (measured at the T1 secondary) drops by 600 Hz on key-down. The idea is to create the receive offset normally used to provide an audible tone for CW signals by deliberately mistuning T2/C6 in order to increase the oscillator load (as compared with the antenna) while receiving. In my prototype, an RIT setting of 600 Hz at mid-range (3540 kHz) produced an offset of 608 Hz at the bottom, and 557 Hz at the top of the frequency range.

Please bear in mind that you don't have to use a transistor ceramic resonator VXO in this radio. I'd like to build a second Reggie transceiver for 40m using a subminiature triode and permeability-tuned-oscillator (PTO), utilizing the "brass-screw" tuning-trick. The keying method used in Reggie ought to allow even a VFO to key cleanly. However, if you increase the oscillator output power be sure to increase the bias voltage at the 1N4007 keying diodes, and be careful not to overdrive the receive mixer diodes.

The circuitry is built "Manhattan-style." The main circuit is mounted to the left-hand bulkhead as shown in Figure 3, while the input/output bandpass filter is affixed to the upper right-hand wall. The variable capacitor was salvaged from an old FM radio. It has a 6:1 ball-reduction mechanism built into the shaft. The extruded aluminum enclosure is a waste off-cut, taken from a section of overhead cable-tray used at the television station where I work. The narrow rectangular shape helps to conserve my limited shelf space.

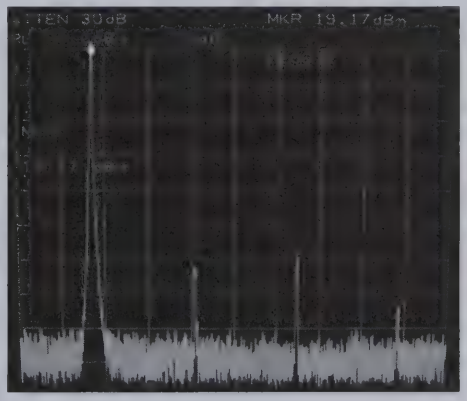

Figure 4—Spectrum display of the Reggie transmitter output.

Figure 4 shows the spectrum of the transmitter output. Harmonics are down by at least 59 dBc at an output power of 83 mW.

Receiver

Reggie is outfitted with a Fessenden heterodyne receiver, which is a continuation of my experiments from last winter, in which I used a 74HC4052 as a switching mixer to downconvert incoming signals to audio range. In this receiver, a simplified version of the mixer used in my Das DereLicht Receiver directly drives a pair of 600 ohm ST-3 headphones made by the Japan Radio Company. The receive MDS measures –90 dBm (7 uVrms). A signal at –71 dBm (63 uVrms) provides excellent copy, while I'd characterize a –56 dBm signal as "loud."

The receiver is actually a variant of the "RAF Heterodyne Receiver" ("RAF" stands for Reginald Aubrey Fessenden) shown in Figure 5 [1]. This little receiver

was used aboard the scout cruiser, USS Salem, during a famous test carried out by the U.S. Navy in the winter of 1912-1913.

As Leonard Fuller recollects in an oral history given to the IEEE, "...the Salem sailed from the Delaware River eastward across the Atlantic, recording alternately from the arc and the spark transmitter [located in Arlington, Virginia]. After about 1200 miles, 1200 to 1500 miles out, it became apparent that the arc was beginning to be superior to the spark, and the arc received signals during daylight in Gibraltar. One of the receivers on the Salem was a beat frequency reception type of receiver. Now, this was before the days of the vacuum tube, so the local oscillator for the beat reception was a small laboratory arc without magnetic field, about the size one could hold in one's hand."

The heterodyne receiver used in my Reggie transceiver is essentially the same as was carried on the Salem during the Atlantic receiving trials. However, in place of an arc BFO I use a Colpitts transistor oscillator. In place of the electrolytic detector I'm using a pair of 1N4148 signal diodes. Still, I've little doubt that "Old Man" Fessenden would have recognized the plan of my receiver.

On my first evening on the air with Reggie, I copied both G3WZT and DL1REM with excellent signals near the bottom of the 80m CW band. I was particularly pleased to have VE1QY/QRP reply to my CQ during my first week of operation. It's amazing that Barry heard my 75 mW signal. Perhaps even more amazing is the fact that my antenna had intercepted enough energy from his 5 watt signal—at a distance of 665 km—to enable me to copy his transmissions. While I do have some grasp of the physics involved, I believe there is no depth of explanation capable of vanishing the beauty and mystery of radio.

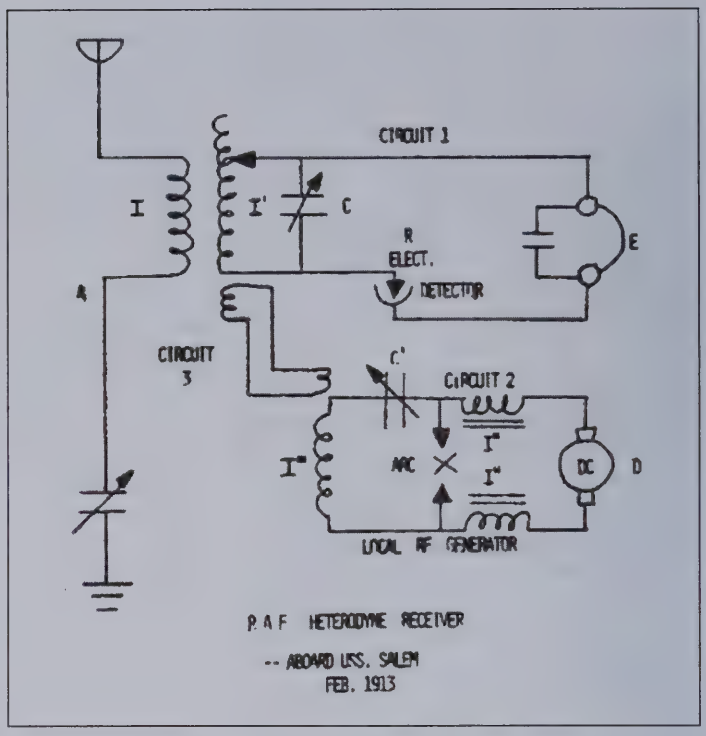

Figure 5—The original RAF receiver.

Excerpts from the Log

"Miracles are explainable. It's the explanations that are miraculous."—*Tim Robinson*

January, 14, 2009: I received a FB email message from Jim, W1PID, following our exciting Rock Mite-Reggie QSO. I've posted it below (with his permission). The subject-line of his message was "Reggie and The Rock Mites."

"I'm sitting here at my desk doing some work with the receiver on 3539... and I realize that someone's calling CQ. Hey wait, I know that call; AA1TJ. So I answer him. Mike and I have a wonderful QSO. He's using the Reggie at 75 mw and I'm running 5 watts. He's a good 559 and I'm copying him very solidly. 3:45 pm local. Anyway, I'm a little embarrassed about 5 watts (QRO, and all) so I suggest we go to 3560 where I can try the Rock Mite. At 500 mw it's the lowest power thing I've got in the shack. So we move, and it works pretty darned well. He's copying me well. He's solid, but it's a bit noisy on my end and every now and then broadcast stuff dumps a few letters. So it wasn't armchair, but it was pretty darned good. And a whole lot of fun."

January 15, 2009: I received a pleasant note from ZL3KE (ex-G1HDQ), today. Kevin offered a great suggestion on how I might dispense with the second supply potential that I've been using up till now. His mod worked perfectly; "right out of the box." Thanks so much, Kevin!

I enjoyed a run of three QRP/QRPp QSOs in a row this afternoon. In particular, K4AXF's 5-watt signal from the Washington, DC area was nothing short of amazing; an honest 569! I came up from the shack later in the evening and found his email massage in my mailbox:

"Michael, I copied your second and third transmission, solidly. First transmission, I was getting my receive set up and missed some. Your transmit signal was clean with nice keying—just like store-bought."

February, 14, 2009: This evening I worked K3OXG at a distance of 478 miles. Lou was running an Elecraft K1 at both 5 watts and 100 mW. I clearly copied two of his transmissons at 100 mW. The fact that it was possible to copy a 4780 mile-per-watt signal using a non-amplified receiver is nothing short of astounding! Up till now, I would not have thought that such a thing was even possible. Obviously, it's made me very happy. Thank you, Lou!

February, 20, 2009: First DX tonight; C6APG in the Bahamas on 80 mW!

February 24, 2009: Having told Dennis, K1LGQ, about my rig, he replied, "You Vermont cowboys really know how to ride rough." I liked that :o).

March 2, 2009: Tonight I worked six stations in the North Carolina QSO party; a new state for Reggie.

March 4, 2009: I've made a total of 106 QSOs with Reggie; working 17 states and 3 Canadian provinces. Western European and Russian stations have been copied on a regular basis.

References

1. Reproduced from Bulletin No. 33, October 1989, of the Amateur Radio Fessenden Society, Courtesy of George Elliott, http://www.radiocom.net/Seitz/.

QRP Contests

Jeff Heatherington—VA3JFF

contest@qrparci.org

The sun is starting to shine longer into the day, the snow is melting and the promise of spring and summer are just around the corner. A new start for a new year and with it comes new ideas, new plans, new sunspots (finally!), new antenna constructions and new opportunities to operate outside as we all enjoy.

So, what newness will we be bringing through the QRP-ARCI Contests? For the most part, that will be up to you! This past January we ran our first Pet Rock Celebration that was won by Dana A. "Mike" Michael, W3TS. This was an idea that was suggested by a reader of this column and participant in our contests. Please keep your suggestions coming on how to make our offerings the best QRP Contests out there. I have received a handful of suggestions in the past couple months that may have some merit, and might be something that we will be able to offer going forward. I want to hear your opinions on the following suggestions:

1. New Member Nuimbers? New members often have paid their subscriptions before the start of a contest, but have not yet received their membership number. In this case they have been sending power output, but they are then only worth 2 points to the other participants. It has been suggested that new members send "NEW" and be worth 5 points in the contest. This seems reasonable to me, but what do the rest of the operators think?

2. Multi-Operator Class? The Fall QSO Party and the Spring QSO Party are the two biggest contests we sponsor. In the past year there have been an increase in multi-operator activities. Usually this is something along the lines of a field-day style operation among friends, or testing a multi-multi contest station for the upcoming contest season. We have never had a multi-op category, but over the past six months I have had requests from several groups to add a multi-op category. Opinions anybody?

Mark Your Calendars!

Summer Homebrew Sprint
July 12, 2009

Silent Key Memorial Sprint
August 15, 2009

VHF Contest
September 12-13, 2009

3. Weekday Contest? The idea of a weekday contest has been floated several times. Many people are available week long for operating, but have to traditionally wait until the weekend for a contest to come along. There are other weekday operating activities, but it doesn't match the thrill of a contest. Times might be difficult to coordinate across the world, and even across individual countries, but what are your thoughts on this idea too?

4. Promote International Activity? The international participation in our big contests in the Fall and Spring are usually there, but the sprints do make that aspect a challenge as well. Does anybody have any ideas on how to promote more participation from countries outside NA? Should we run a EU Sprint? How would you like to see that run?

Please keep your suggestions coming to contest@qrparci.org

Recent Contest Results

As for this quarter's results, we start way back in 2008 with the Top Band Sprint. It's always a challenge running top band with QRP, but it's a challenge our members are always up for! Tim Colbert, K3HX, a regular participant in our contests from Pennsylvania used that prime location in the highly populated North East to take the crown with 30,429 points. It was a tight battle throughout the top five, and Ralph Matheny, K8RYU, took second place with 27,048 points just edging out Brian Campbell, VE3MGY, has his respectable score of 26,690 points. Bill Hill, W3IBT, with 23,506 points and Will Bowser, K9FO, with 22,701 points rounded out the top five.

Our 2008 contest season ended with the ever popular Holiday Spirits Homebrew Sprint in December. It appeared as though conditions may be starting to improve, with several participants commenting to me about the easier time they had on the air. Bob Patten, N4BP, returned to top spot with 217,866 points, easily outdistancing second place finisher Randy Hargenrader, K4QO's, total of 97,777 points. Randy Foltz, K7TQ, finished third with 81,253 points with Steve Whitton, K9IS, taking fourth place with 58,220 points and Gill Gay, W4RWY, rounding out the top five with 56,170 points.

As was stated earlier, the first Pet Rock Celebration Spring ran in January of 2009, and Dana A. "Mike" Michael, W3TS, took top spot with 43,576 points. Dana used a DC RX transceiver for 40m and 80m and a HB transmitter on 20m scoring the all important bonus points for crystal controlled rigs. Second place was John T. Lainey III, K4BAI, who used his "big rig" to score 28,350 points and third place went to Bob Patten, N4BP, who used a little SST-20 to manage 26,021 pts. Paul Kirley, W8TM, used a fully featured K3 for a fourth place finish with 20,174 points and Donald C. Younger, W2JEK, took fifth place honors with 16,344 points from a two-fer transceiver. A good mix of crystal controlled rigs and big rigs made this an interesting contest and a pleasant change from our usual offerings.

The other contest completed so far in 2009, was another change from our usual standards. This time we put aside our keys (gasp!) and dusted off microphones to tackle the Fireside SSB Sprint. It was a different format, but a regular name graced the top spot. Bob Patten, N4BP, took home his first win of 2009 with 44,128 points and a contest high 70 QSOs and 32 SPCs. Richard Donahue, KØPIR, took second place with 18,816 points just edging out third place finisher Randy Shirbroun, NDØC, and his total of 17,136 points. Alan

Top Band Sprint Results

Call	QTH	Score	QSOs	PWR	PTS	SPC	MULT	Rig + Ant
K3HX	PA	30429	60	< 5W	189	23	7	
K8RYU	OH	27048	50	< 5W	184	21	7	K2 + 1/4 wave vertical, K9AY RX ant
VE3MGY	ON	26690	38	< 1W	157	17	10	IC756 + 6 Bev., 2 Loops, 1/2 wave dipole, etc.
W3IBT	PA	23506	31	< 5W	146	23	7	
K9FO	IL	22701	39	< 5W	141	23	7	Orion + Inverted L, 3 Beverages
W3TS	PA	16660	31	< 1W	119	14	10	Orion + 1/8 wave wire tee
N9NE	WI	12768	30	< 5W	114	16	7	K2 + Inverted L
NK8Q	PA	9282	30	< 5W	102	13	7	K2 + Windom, Inverted L
W2SH	NJ	6314	20	< 5W	82	11	7	Argonaut V + Inverted L
WT9U	IN	3843	14	< 5W	61	9	7	TS850 + 1/4 wave sloper
WA8WV	WV	3843		< 5W	61	9	7	
KN1H	NH	3528	15	< 5W	63	8	7	FT817 + 380ft End-Fed Wire
KD2MX	NJ	3248		< 5W	58	8	7	FT897 + 600ft Loop
N4SAM	AL	3087	11	< 5W	49	9	7	
N9XO	IN	2058	9	< 5W	42	7	7	
VE3CUI	ON	1190	8	< 5W	34	5	7	FT980 + 3-element phased inverted L array
AC9R	TN	1008	6	< 5W	24	6	7	OMNI-A + Long Wire
KC2SKI	NY	392	11	> 5W	49	8	1	
W4SEC	FL	168		< 5W	12	2	7	K2 + TX-DX Thunderbolt, Beverage
NØOCT	MO	56	2	< 5W	4	2	7	
AA5TB	TX	14	1	< 5W	2	1	7	FT897 + Inverted L

Muldawer, N3ALN, took fourth place with 8,176 points, and Dennis Bullock, N6DIT, went into the field to snag some bonus points an score a top five finish with 5,392 points.

The next quarter is an exciting one for us. We will run one of our biggest contests, the Spring QSO Party in April, the evening extravaganza of the Hootowl Sprint in May and then of course our milliWatt Field Day runs in June. Lets all get on the air and enjoy the start of the newest sunspot cycle.

Until next time, keep your power down and your QSO rates up.

—73/72, Jeff, VA3JFF

Top Band Sprint Soapbox

Much QRN, especially at end of Contests. Conditions poor overall.—**K8RYU**

Started in a sleet storm with lots of QRN. After 4 hours conditions improved but not many stations. I always enjoy the Top Band!—**K9FO**

Very noisy and tough conditions but still fun (???!!!)—**W3TS**

Conditions were atrocious: QSB, weak signals, and QRN that sounded like summer T-Storms. Still it was enjoyable.—**N9NE**

Terrible conditions here, lots of QRN. Seemed to get a bit better later in the evening. I think the geomagnetic field was being pushed to the south by a higher solar wind speed causing extra attenuation as well.—**NK8Q**

Top Band Sprint Top 5 Results

K3HX	30,429	Tim Colbert
K8RYU	27,048	Ralph Matheny
VE3MGY	26,690	Brian Campbell
W3IBT	23,506	Bill Hill
K9FO	22,701	Will Bowser

Conditions were very difficult for all, but a good time was had. This is a fun warm up for the ARRL 160 and a great way to show that QRP works just fine on 160.—**KN1H**

Conditions and activity seemed pretty good. Only had about 30 minutes to play. Good fun as always.—**KD2MX**

Better luck next year!—**W4SEC**

Worked 1 station. Woohoo! Not much QRP activity to be found in this part of the country on 160m.—**AA5TB**

Holiday Spirits Homebrew Sprint Soapbox

Good participation! 20M went long early and then shut down. After several tries, finally completed an exchange with KL7IKV just before QSY to 40m. My usual high noise levels were thankfully low for a change making this an enjoyable activity. The K2 performed flawlessly ater being powered down for several months while its big brother was in use.—**N4BP**

Holiday Spirits Homebrew Sprint Top 5 Results

N4BP	217,866	Bob Patten
K4QO	97,777	Randy Hargenrader
K7TQ	81,253	Randy Foltz
K9IS	58,220	Steve Whitton
W4RWY	56,170	Gill Gay

Great conditions this year and great fun as usual when they are!—**K4QO**

Catch you all again next time.—**K7TQ**

Cold and windy, great day for an ARCI contest.—**K9IS**

Great conditions and good turnout - thanks to all who patiently dug out my 900 mW signal.—**W4RWY**

Nice little contest. Lets hope for better propagation next year. 15m and up were stone cold dead.—**KB3WK**

Big snow storm all day. Good day to be inside with my swedish girl friend bringing me snacks. 18" of snow!—**KØZK**

40 and 80m were the best bands for me. Hope all had a great holiday season.—**KD2JC**

Great conditions! We hit a good day this time. Lots of new (to me) calls and 23 states. Thanks for the fun on a snowy day.—**VA3RKM**

This was an eciting contests. Strange QSB made signals jump out of no where and then nearly disappear again. I like the

Holiday Spirits Homebrew Sprint Results

Call	QTH	Score	QSOs	PWR	PTS	Bands	SPC	MULT	Bonus	Rig + Ant
N4BP	FL	217866	105	< 5W	426	ALL	63	7	30000	K2 + Cushcraft A4S, 40/80 Armadillo Trap Dipole
K4QO	SC	97777		< 5W	271	ALL	41	7	20000	K2 + 2 ele beam, 160m wire vertical, 500ft loop
K7TQ	ID	81253	62	< 5W	261	20/40	39	7	10000	K2 + Force 12 C4SXL
K9IS	WI	58220		< 5W	182	ALL	30	7	20000	K1 + 80m Loop
W4RWY	AL	56170	39	< 1W	171	20/40	27	10	10000	K3
KN1H	NH	55360	29	< 1W	136	ALL	26	10	20000	HB 6-band VXO, HB 7 band rec. + End Fed 380ft wire
K4DZR	TN	54860	38	< 5W	166	ALL	30	7	20000	HB Xcvr
W8TM	OH	49900	51	< 5W	228	20/40	25	7	10000	K1 + Inv vee
KB3WK	MD	49750	32	< 1W	139	ALL	25	10	15000	K2 + 3 ele yagi and dipoles
K4KSR	VA	43750		< 1W	135	LOW	25	10	10000	K1 + Trapped dipole, inv L, Windom
KØZK	ME	43350	33	< 5W	150	ALL	27	7	15000	K2 + Dinky *SS Loop in a dead apple tree.
KD2JC	NJ	41544	37	< 5W	158	ALL	24	7	15000	K2 + 40m loop and G5RV
K4PBY	FL	41120	35	< 5W	172	ALL	30	7	5000	40m HB Xcvr, Argonaut
VA3RKM	ON	40480		< 5W	130	ALL	28	7	15000	K2 + Verticals and long wire
VE3UTT	ON	40425	41	< 5W	175	ALL	33	7	0	
AI2T	NY	34992	29	< 5W	136	ALL	21	7	15000	K1 + Random Long Wire
KJ4AOM	KY	34398	42	< 5W	189	40/80	26	7	0	
K4MF	FL	33345	32	< 5W	145	ALL	23	7	10000	K1 and IC736 + 2 ele tribander, dipole
N1LU	NH	30015		< 5W	143	ALL	15	7	15000	
KG7E	ID	28942	27	< 5W	123	20/40	22	7	10000	K1 + Dipole
KD2MX	NJ	26424	21	< 5W	102	ALL	16	7	15000	KX1 + 600ft loop
W3TS	PA	26120		< 1W	51	ALL	12	10	20000	K2 + 1/8 wire tee for 160, inv vee, 2 ele yagi
NØEVH	MO	24630	22	< 5W	95	40/80	22	7	10000	K3 + 80m Loop
VE3KQN	ON	24389	12	< 5W	57	ALL	11	7	20000	Sierra + Portable 3ft dia mag loop
W3IBT	PA	23506	31	< 5W	146	ALL	23	7	0	
K9DXA	IL	22376	22	< 5W	104	20/40	17	7	10000	K1 + 40m dipole, longwire
NM5S	NM	21718	22	< 5W	93	20/40	18	7	10000	ATS-3B + 80m inv vee, Gap Tital Vertical
WA5RML	TX	20080		< 5W	96	20/40	15	7	10000	K2 + G5RV
WØUFO	MN	18820		< 5W	84	ALL	15	7	10000	K2
NU7T	NV	17980	17	< 5W	76	20/40	15	7	10000	KX1 + Mosely TA33jr
WG7Y	WY	17255	29	< 5W	145	20/40	17	7	0	
K4BAI	GA	17220	27	< 5W	123	20/40	20	7	0	FT1000MP + TH6DXX, dipole, zepp
KW4JS	TN	16800	24	< 5W	120	ALL	20	7	0	
N6DIT	CA	16762	18	< 5W	69	20/40	14	7	10000	KX1 + G5RV
KK5PJ	TX	16370	16	< 5W	65	20	14	7	10000	K2 + MP-1 Vertical
AD6GI	CA	16174		< 5W	63	20/40	14	7	10000	K3 + Dipoles
K3HX	PA	13965	25	< 5W	95	20/40	21	7	0	Orion I
WA1WQG	CT	11554		< 5W	37	20/40	6	7	10000	K1 + OCF Dipole
K6WSC	CA	11312		< 5W	101	20/40	16	7	0	IC-746PRO + Alpha Delta DXCC
KD2MU	NY	10875	5	< 5W	25	20/80	5	7	10000	K2 + 135ft dipole
KC2KME	NY	10014	1	< 5W	2	40	1	7	10000	HB Phoenix Transceiver + HB End Fed Wire
K4AEN	VA	9282	24	< 5W	102	20/40	13	7	0	FT1000D + 80m Full Wave Loop
K4JPN	GA	6568	7	< 5W	32	80	7	7	5000	K2 + 80m Zepp
N2YYF	NJ	6344	7	< 5W	32	40	6	7	5000	ARK-4 + Vertical
KL7IKV	AK	5770	5	< 5W	22	20	5	7	5000	K3 + Dipole, Vertical
AB8FJ	OH	5200	2	< 1W	10	40	2	10	5000	SW-40 + End Fed Random Wire
W2JEK	NJ	5098	2	< 5W	7	20	2	7	5000	OHR-500
N2EI	NJ	4543	13	< 5W	59	40/80	11	7	0	
N7RN	AZ	3311	11	< 5W	43	20	11	7	0	
K0PIR	SD	2961		< 5W	47	20/80	9	7	0	TS570D + Inverted V, Hygain TH2-MK3
VE3CQH	ON	2050	1	< 5W	5	20	1	10	2000	Little Joe Xmtr, Drake R7A Rcvr + G5RV
NØOCT	MO	1568	7	< 5W	32	40/80	7	7	0	Corsair

sprints because they don't take as much of a chunk out of your weekend. Good turn out.—**AI2T**

Could only operate a little over an hour.—**K4MF**

A good time as always. Conditions not terrible which equates to relatively good these days. A bit too cold and snowy to take the KX1 outside.—**KD2MX**

Had a little time before Family Christmas get togeather so made a few contacts.—**W3TS**

Pet Rock Celebration Results

Call	QTH	Score	QSOs	PWR	PTS	Bands	SPC	MULT	Bonus	Rig + Ant
W3TS	PA	43576		< 5W	168	ALL	26	7	13000	DC RX Xcvr 80m and 40m, HB TX 20m +
K4BAI	GA	28350	35	< 5W	150	20/40	27	7	0	FT1000MP + TH6DXX, Dipole, Zepp
N4BP	FL	26021	36	< 5W	143	20	21	7	5000	SST-20 + Cushcraft A4S
W8TM	OH	20174	34	< 5W	131	20/40	22	7	0	K3 + 40m Inv Vee
W2JEK	NJ	16344	7	< 5W	32	ALL	6	7	15000	Two-Fer Xcvr
K3HX	PA	14042		< 5W	118	20/40	17	7	0	
K7TQ	ID	11461	16	< 5W	71	20	13	7	5000	Wilderness SST + Miniboots + Force 12 C4SXL
W5ESE	TX	10900	4	< 500 mW	20	20/40	3	15	10000	Rockmites + 67ft End Fed Wire
K2EKM	VA	10600	4	< 1W	20	20/40	3	10	10000	DC40, DC20a + 88ft Doublet
WA5BUC	TX	10050	1	< 1W	5	20	1	10	10000	Rockmite + Vertical
KD2JC	NJ	8885	8	< 500 mW	37	40	7	15	5000	Rockmite + 40m Loop
N6DIT	CA	7772	10	< 5W	44	20/40	9	7	5000	TS-50 + Vertical
VA3RKM	ON	6643		< 5W	73	20/40	13	7	0	K2 + Verticals
KØLWV	MO	6279	15	< 5W	69	20/40	13	7	0	IC718 + Longwire Vee Beam and 20m Wire GP
AB8FJ	OH	6000	5	< 1W	25	40	4	10	5000	Rockmite, 40-9er + End Fed Random Wire
WA6L	CA	5840	6	< 1W	21	20	4	10	5000	Rockmite + Log Periodic
W5RCP	TX	5625	5	< 5W	25	20/40	5	5	5000	K1 + Vertical
N2YVF	NJ	4480	14	< 5W	64	40	10	7	0	ARK-4
VE3CQH	ON	3600	4	< 1W	20	40	3	10	3000	Little Joe Xmtr, Drake R-7A Rcvr. + G5RV
VA2NB	QC	1960		< 5W	40	20/40	7	7	0	FT897 + Double sized G5RV
WA1WQG	CT	1120		< 5W	32	40	5	7	0	K1 + OCF Dipole
WA8SAN	OH	770	5	< 5W	22	20	5	7	0	K1 + Gap Vertical
NØEVH	MO	476	4	< 5W	17	ALL	4	7	0	K3 + 80 meter loop
W5MSQ	TX		10	< 5W	44	20/40	10	7	5000	

Forty meters was in pretty good shape providing 19 Qs before switching to 80 for 3 more. Ran out of time with family obligations, but sure did enjoy hearing everyone on the air.—**NØEVH**

Well, I found the conditions to be really poor on this end and managed to eek out only 12 contacts on 3 bands in just over 3 hours of operations. I was operating a Wilderness Radio Sierra at 4 watts and my antenna was a portable resonant magnetic loop, 3 feet in diameter mounted on a camera tripod sitting beside me. I had a pre-contest warmup qso with K1IQI in MA who gave me a 339 (yuk) but realized after the fact that my swr bridge was still switched in at the time which attenuated my signal by about 12db so my radiation power was abt 0.250 watts...hey, I can accept the 339 (HI).—**VE3KQN**

Propagation was not very good, but there's something about the "thrill of the hunt" combined with meeting old friends again! Hope everyone had a Merry Christmas!—**WA5RML**

Conditions seemed fair but not many stations on. I heard no one on 80m at 2320. My time was limited but it was fun.—**WØUFO**

Another enjoyable afternoon. No QRN—A real treat!—**KK5PJ**

Pet Rock Celebration
Top 5 Results

W3TS	43,576	Dana A. Michael
K4BAI	28,350	John T. Lainey III
N4BP	26,021	Bob Patten
W8TM	20,174	Paul Kirley
W2JEK	16,344	Donald C. Younger

Wow! Severe QSB here. Tnx to each of you for your patience. Hope to CU next test.—**AD6GI**

Always a good time!—**K3HX**

This was my first QRP operation ever, and lots of fun! Thanks.—**K6WSC**

I love using my HB Phoenix transceiver with HB End Fed Wire slung into a tree. Thanks again to Dan Metzger K8JWR for his Phoenix atricle. This was my first transceiver and has brought me hours of enjoyment.—**KC2KME**

Only worked my own state on 20, but one of those contacts was with my good buddy and operating partner Rob, KK4R.—**K4AEN**

Good to hear some signals on 80M, I got on to late for 40M and 20M they were dead by 2340Z.—**K4JPN**

Almost all signals heard were in and out of the noise—very weak here. Therefore my QSO rate was very thin! Only signal that really kicked up the S-Meter was N7RN, and based on his earlier signals he must have turned an antenna my way. I was also distracted at one point by a V44 at the bottom of the band! Thanks to all who worked to pull my sigs out of the mud and thank you for running this contest!—**KL7IKV**

Where was everyone? Had 2 QSOs on 20, heard nothing on 40 and 80.—**W2JEK**

Herewith my first contest entry in over 40 years. K4KSR pushed me into making a transmitter (Little Joe, Sep 81 *QST*), junk box T/R switch, ATU ($2 in parts) and G5RV, and shoved me into this test.—**VE3CQH**

Tried running my NN1G 40-40 but just couldn't get it done.—**NØOCT**

Pet Rock Celebration Soapbox

SST-20 is a real eardrum buster with it's audio derived AGC. Condx were good, but participation was disappointing. Worked GM3OXX and G3ILO in EU and VE7XF who was running 250mW.—**N4BP**

Good propagation on 20. SST and Miniboots worked well together.—**K7TQ**

Fireside SSB Sprint Results

Call	QTH	Score	QSOs	PWR	PTS	Bands	SPC	MULT	Bonus	Rig + Ant
N4BP	FL	44128	70	< 10W	197	ALL	32	7	0	K3 + Cushcraft A4S
KØPIR	SD	18816		< 10W	168	20	16	7	0	TS570D + Hygain TH-2MK3
NDØC	MN	17136	62	< 5W	153	20/40	16	7	0	Argonaut 509 + 3 el tribander and dipole
N3ALN	MD	8176	26	< 10W	73	20/80	16	7	0	IC756 + Windom-80
N6DIT	CA	5392	4	< 10W	14	20/40	4	7	5000	TS50S + Verticals, Coils, Ground Planes
N3TLQ	NJ	5035	1	< 10W	5	20	1	7	5000	IC706MKIIG + Buddistick
N7VF	AZ	3150	17	< 10W	45	20/40	10	7	0	
W8TM	OH	1127	7	< 10W	23	ALL	7	7	0	K3 + 40m inv vee
KL7IKV	AK	1050	8	< 10W	25	20	6	7	0	K3 + Vertical
WB3AAL	PA	1050	8	< 10W	25	ALL	6	7	0	K2 + HF9V, triband beam
W2JEK	NJ	924	8	< 10W	22	20/80	6	7	0	FT840
KD2JC	NJ	294	4	< 10W	14	20/80	3	7	0	K2 + G5RV, 40m loop
VA3RKM	ON	98	2	< 10W	7	20	2	7	0	K2 + Vertical
W5ESE	TX	35	1	< 10W	5	20	1	7	0	

I sure had fun in the Pet Rock Sprint. Tried for about 40 minutes to make a contact using my 80m Rockmite (on 3579.545 kHz; the Colorburst frequency), but had no takers. Milliwatting with a rock bound direct conversion transceiver is challenging, but fun. I operated portable from my mother's home near Kerrville, Texas, but powered the radios with a 12V wall wart.—**W5ESE**

Portable from Tom Bass Park, Pearland, TX.—**WA5BUC**

Very enjoyable. A little frustrating at first, should have practiced with the Rockmite first.—**KD2JC**

Did it in the boonies in the MUD.—**N6DIT**

Mediocre conditions, but could be worse. K4BAI and N4BP were booming in, as usual.—**VA3RKM**

I Like the hours of the contest perfect for me. Tnx, I had fun. QRN hvy on 40.—**KØLWV**

This was a fun contest. Used my Rockmite-40 and Norcal 40-9er. Looking forward to next year already!—**AD8FJ**

This contest Rocks! I is a great idea and I had a blast. My total operating time was only about an hour due to bad QRM from the XYL. But surprisingly, when I was on the air I did not have that much trouble making contacts. ALL my contacts were from calling CQ with 750 mw. I tried answering other stations but had no luck.—**WA6L**

Fireside SSB Sprint Top 5 Results

N4BP	44,128	Bob Patten
KØPIR	18,816	Richard Donahue
NDØC	17,136	Randy Shirbroun
N3ALN	8,176	Alan Muldawer
N6DIT	5,392	Dennis Bullock

Portable from Putnam Peak, TX.—**W5RCP**

Four QSOs in three states in 1.5 hours with one crystal-controlled watt: not bad for my second contest if 40 years!—**VE3CQH**

Had a lot of fun from my cottage station. Maybe for next year you should designate QRP watering holes ±1 kHz can only be used by Rockbound stations to call CQ, that would make it easier to dig them out of the noise/QRM as they are generally QRPp.—**VA2NB**

It was fun to find a few rock bound rigs and give them a QSO. Very relaxed sprint for me as I was really helping the XYL take down the Christmas decorations, at least that is what she thought I was doing!—**NØEVH**

Multi Operator from Tom Bass Park in Pearland, Texas. Ops: WA5BUC, WD5BDX, W5RH, W5HNS and W5ACM—**W5MSQ**

Fireside SSB Sprint Soapbox

No stamina to carry through, bronchitis/pneumonia. Put in about 2.5 hours. 20M went long early, woked WA, OR, CA, KL7. Listened on 40M for about thirty seconds and shut rig off, wall to wall AM broadcast.—**N4BP**

Activity seemed very low. Went down to 40 to get one QSO, otherwise everything else was on 20.—**NDØC**

This was my first QRP contest and I had a blast! I worked someone in CA on a bike! Thanks for having the contest.—**N3ALN**

Tnx for the SSB Sprint, but CW Forever!—**N6DIT**

Not a lot of QSOs but did better than I expected. I usually S&P so I was surprised to get several answers when I tried CQing. Many thanks to those who worked to copy me, and apologies to "Whiskey 8 ???" whom I just could not dig out of the noise.—**KL7IKV**

Had fun working some stations I usually work on CW.—**WB3AAL**

Foreign broadcast wiped out 40 meters. Things will get better soon.—**KD2JC**

Not much action.—**VA3RKM**

I enjoyed the event, although there didn't seem to be much activity. Using the old Argonaut 509 was a hoot. Have an old Genave hand microphone to go with it.—**W5ESE**

Mark Your Calendars!

Summer Homebrew Sprint
July 12, 2009

Silent Key Memorial Sprint
August 15, 2009

VHF Contest
September 12-13, 2009

Contest Announcements

E-mail Log Submission:
Submit Logs in plain text format, with a summary stating your Callsign, Entry Category, Actual Power and Station Description, along with score calculation to contest@qrparci.org

Mail Log Submission:
Submit Logs with a summary stating your Callsign, Entry Category, Actual Power and Station Description, along with score calculation to:

(Contest Name)
c/o Jeff Hetherington, VA3JFF
139 Elizabeth St. W.
Welland, Ontario
Canada L3C 4M3

Results:
Will be published in *QRP Quarterly* and shown on the QRP-ARCI website.

Certificates:
Awarded to the top scoring entrant in each category. Certifi-cates may be awarded for 2nd and 3rd place if entries are sufficient in a category. Some contests award certificates to the top scoring operators in each State, Province or Country.

2008 Summer Homebrew Sprint

Date/Time:
2000Z to 2359Z on 12 July 2009.

Mode:
HF CW Only.

Exchange:
Members: RST, State/Province/Country, ARCI member #
Non-Members: RST, State/Province/Country, Power Out

QSO Points:
Member = 5 points/QSO
Non-Member, Different Continent = 4 points/QSO
Non-Member, Same Continent = 2 points/QSO

Multiplier:
SPC (State/Province/Country) total for all bands. The same station may be worked on multiple bands for QSO points and SPC credit.

Power Multiplier:
>5 watts = x1
>1 - 5 watts = x7
>250 mW - 1 watt = x10
>55 mW - 250 mW = x15
55 mW or less = x20

Suggested Frequencies:

160m	1810 kHz
80m	3560 kHz
40m	7030 kHz (please listen at 7040 kHz for rock bound participants)
20m	14060 kHz
15m	21060 kHz
10m	28060 kHz

Score:
Final Score = Points (total for all bands) x SPCs (total for all bands) x Power Multiplier + Bonus Points.

Bonus Points:
For homebrew gear (per band) add 2,000 points for using HB transmitter; add 3,000 points for using HB receiver; or add 5,000 points for using HB transceiver. Definition of Homebrew is any equipment built and soldered by you, either scratchbuilt or from a kit is acceptable. Plug and Play modular style kits are not eligible for the bonus..

If you are operating PORTABLE using battery power AND a temporary antenna, add 5,000 points to your final score. (You can NOT be at your shack operating from battery power using your home station antenna to qualify for this bonus.) This is to help level the playing field for contesters who work from the field against contest stations with 5 element yagis at 70 ft.

Categories:
Entry may be All-Band, Single Band, High Bands (10m-15m-20m) or Low Bands (40m-80m-160m)

How to Participate:
Get on any of the HF bands except the WARC bands and hang out near the QRP frequencies. Work as many stations calling CQ QRP or CQ TEST as possible, or call CQ QRP or CQ TEST yourself! You can work a station for credit once on each band.

Submissions:
Entries must be postmarked on or before 12 August 2009.

2008 Silent Key Memorial Sprint

Purpose:
Our contest celebrates and honors the QRP luminaries who no longer answer CQs. Those generous people who graciously donated to the QRP community their time, effort and knowledge to advance the premise that more fun could be had using less than 5 watts. Some were irascible and some were even considered curmudgeons, but when you took a keen look at their accomplishments and listened to those who knew them well you discovered truly wonderful people who would give you their last diode. The people we are celebrating are well known among the QRP Community. Some passed recently and some have enjoyed their reward many years. They are not forgotten for their accomplishments live on either on the bands, the internet, through published works or organizations that benefited from their largess. This contest celebrates ALL SKs who now call CQ from above, where all sigs are 599 and all contacts QSL 100%. Celebrate the many SKs that we have known and loved in years past.

Date/Time:
1500Z to 1800Z on 15 August 2009.
Mode:
CW Only
Exchange:
Members: RST, State/Province/Country, ARCI member #
Non-Members: RST, State/Province/Country, Power Out
QSO Points:
Member = 5 points/QSO
Non-Member, Different Continent = 4 points/QSO
Non-Member, Same Continent = 2 points/QSO
Multiplier:
SPC (State/Province/Country) total for all bands. The same station may be worked on multiple bands for QSO points and SPC credit.
Power Multiplier:
>5 watts = x1
>1 - 5 watts = x7
>250 mW - 1 watt = x10
>55 mW - 250 mW = x15
55 mW or less = x20
Suggested Frequencies:

160m	1810 kHz
80m	3560 kHz
40m	7030 kHz (please listen at 7040 kHz for rock bound participants)
20m	14060 kHz
15m	21060 kHz
10m	28060 kHz

Score:
Final Score = Points (total for all bands) x SPCs (total for all bands) x Power Multiplier + Bonus Points.
Bonus Points:
If you are operating PORTABLE using battery power AND a temporary antenna, add 5,000 points to your final score. (You can NOT be at your shack operating from battery power using your home station antenna to qualify for this bonus.) This is to help level the playing field for contesters who work from the field against contest stations with 5 element yagis at 70 ft.
Categories:
Entry may be All-Band, Single Band, High Bands (10m-15m-20m) or Low Bands (40m-80m-160m)
How to Participate:
Get on any of the HF bands except the WARC bands and hang out near the QRP frequencies. Work as many stations calling CQ QRP or CQ TEST as possible, or call CQ QRP or CQ TEST yourself! You can work a station for credit once on each band.
Submissions:
Entries must be postmarked on or before 15 September 2009.

2009 QRP-ARCI VHF Contest

Date/Time:
1900Z on 12 September 2009 through 0400Z on 13 September 2009.
Bands:
All bands over 50 MHz as outlined in the ARRL January VHF Sweepstakes Rules
Mode:
Any legal mode.
Additional Operating Rules:
QSOs utilizing repeaters of any kind are prohibited.
QSOs on the National Simplex Frequency 146.52 MHz are prohibited.
Exchange:
4 digit Maidenhead Grid Square Locator as outlined in the ARRL VHF Sweepstakes Rules
Entry Categories:
Single Operator
Rover (up to two operators allowable)
QSO Points:
1 point for 50 MHz and 144 MHz QSOs
2 points for 222 MHz and 432 MHz QSOs
4 points for 902 MHz and 1296 MHz QSOs
8 points for 2.3 GHz or higher QSOs
Power Multiplier:
>10W = x1
>5-10W = x4
>1-5W = x7
>250 mW - 1 W = x10
>55 mW - 250 mW = x15
55 mW or less = x20
Score:
Final Score = Points (total for all bands) x Maidenhead Grid Squares (total worked on each band) x Power Multiplier.
Special Scoring for Rovers only:
The final score consists of the total number of QSO points from all bands multiplied by the sum of unique multipliers (grid squares) worked per band (regardless of which grid square they were made in) plus one additional multiplier for every grid square from which they successfully completed a contact.
Bonus Points:
There are NO bonus point for this contest.
Best reason to participate:
A fun mixed mode QRP VHF contest.
Submissions:
Entries must be postmarked on or before 13 October 2009.

●●

After the Contest...

All contest participants are encouraged to post their claimed scores and contest stories on the QRP-F Forum at www.qrparci.org!

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An abondoned lighthouse between Green Bay and Lake Michigan. N8ET operated near many lighthouses on his Great Lakes sailing excursion.

"Sailing with Ham Radio on the Great Lakes" ***—page 46***

A gorgeous view from the trail on the way to Uncompahgre Peak, high in the Colorado Rockies, a sight appreciated by everyone—man or beast!

"QRP 'Over the Top'" ***—page 28***

An ice-encrusted fire lookout tower makes a great antenna support for QRP operation. It probably reminds some of us of FYBO, although others might prefer the Fireside Sprint!

"Polar Bear QRP Pilgrimage to the Mountains" ***—page 50***

Top rated. Affordable. Great support.

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It's no secret: the Elecraft K3 has become the clear choice of contesters, DXers, and discriminating operators worldwide. Topping the charts in receiver test categories, it has powered some of the largest, most successful DXpeditions in history, and helped operators notch record-breaking wins in CW, RTTY, and SSB contests.

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